National Renewable Energy Laboratory
Innovation for Our Energy Future

NREL's Renewable Energy Finance Tracking Initiative (REFTI)

Q3 2010 Summary

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February 10, 2011

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy operated by the Alliance for Sustainable Energy, LLC

Housekeeping

- Webinar: Got audio?
  - Call-in number: **800-369-1894**
  - participant access code: **2551445**

•Presentation, webinar recording, and original aggregated spreadsheet data will be made available at NREL's new RE Finance website:

http://financere.nrel.gov/

Agenda

- Intro to REFTI Program
  - Background/Vision
- Q3 2010 Questionnaire Results
  - Will generally follow REFTI questionnaire progression
  - Trend across multiple quarters
  - Technology Breakout
- Question & Answer
  - Submit via internet conference and we will respond at the end

Data Confidentiality

- Ensuring REFTI data confidentiality critical to NREL
- Data gathered through REFTI will only be utilized for:
  - *Providing aggregate values for model inputs*
  - *Reporting trends*
  - *Participant-specific data will not be utilized or distributed in any way*
- Non-disclosure agreements are available
  - *Executing an NDA is fully voluntary*
  - *3 – 12 month NDAs are available*
- Please let us know if you have any concerns over data provided through this webinar
  - *Slides will not be made available immediately to allow time to raise concerns*

Caveats

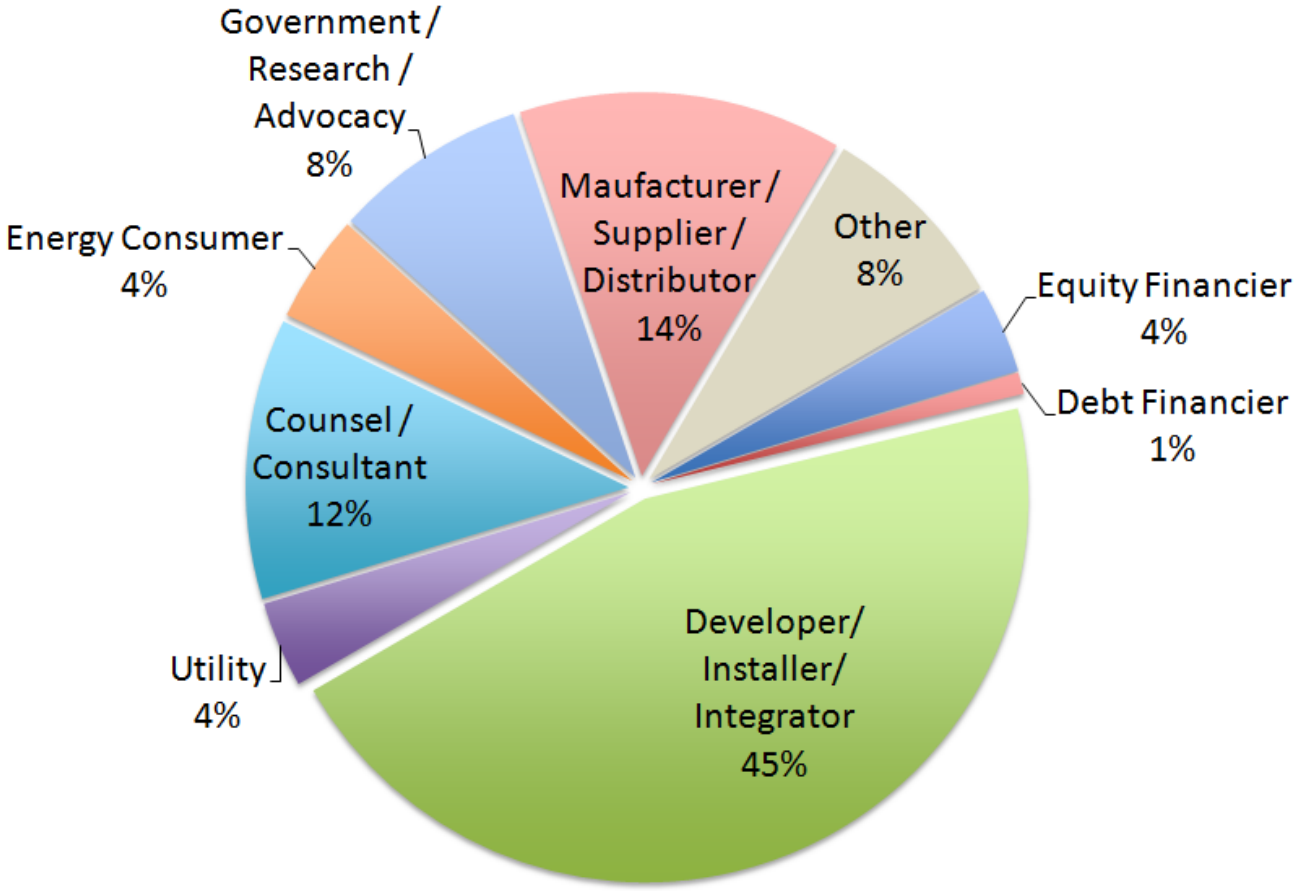
- This is a summary of data as reported by REFTI participants
- In general, data provided was not validated by NREL
- Potential concerns:
  - Duplicate data
  - Definition of “financial closure”
  - Small sample size

REFTI Project Vision

- Make database more useable
  - Tabbed browsing
  - Easier location of graphics
- Incorporate database into NREL's System Advisor Model (SAM)
- Improve statistical significance of dataset

Table of Contents

Participation: Q3'10 Firm Composition



110 people entered the questionnaire; 83 left contact info. Developer / Installer / Integrator represented largest segment with 45%

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REFTI Questionnaire: Q3 (p. 2 – project info)

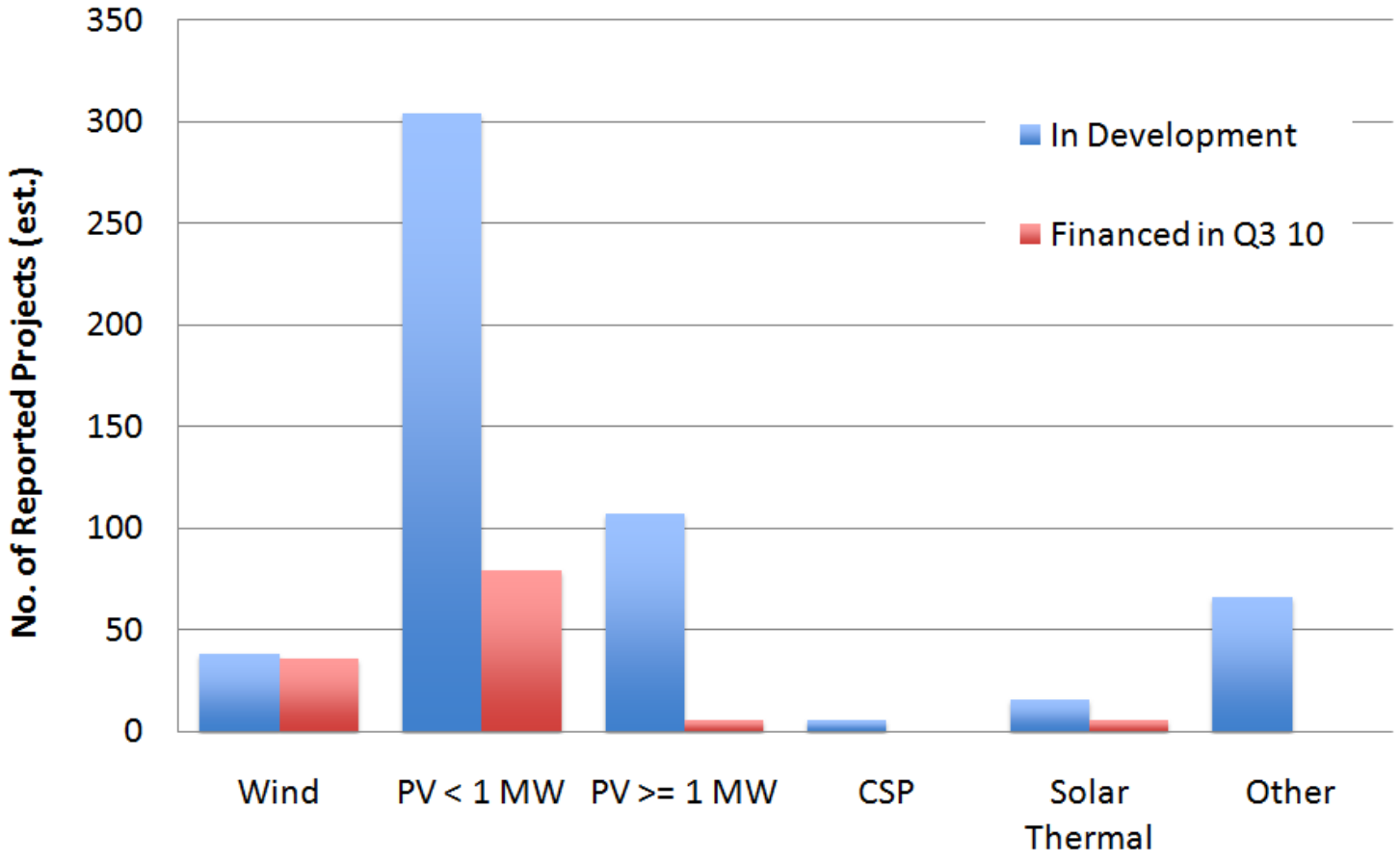
3. Please tell us about your projects IN DEVELOPMENT and those that CLOSED FINANCING in Q3 2010...

***** Note: new MW bins *****

	No. of Projects in Development	Aggregate Capacity in Development (gross kW / MW)	No. of Projects Financially Closed (Q3)	Aggregate Capacity Financially Closed (gross kW / MW)	Form of Financial Closure
Wind					
Solar - PV (< 1 MW)					
Solar - PV (>= 1 MW)					
Solar - CSP					
Solar Thermal (non-elec)					
Geothermal					
Biomass - Elec					
Biomass - Non-elec					
Hydro					
Other Technologies					

Comments

Number of RE Projects Reported



82 respondents reported approximately 537 projects in development, with 72 projects having reached financial closure of some kind

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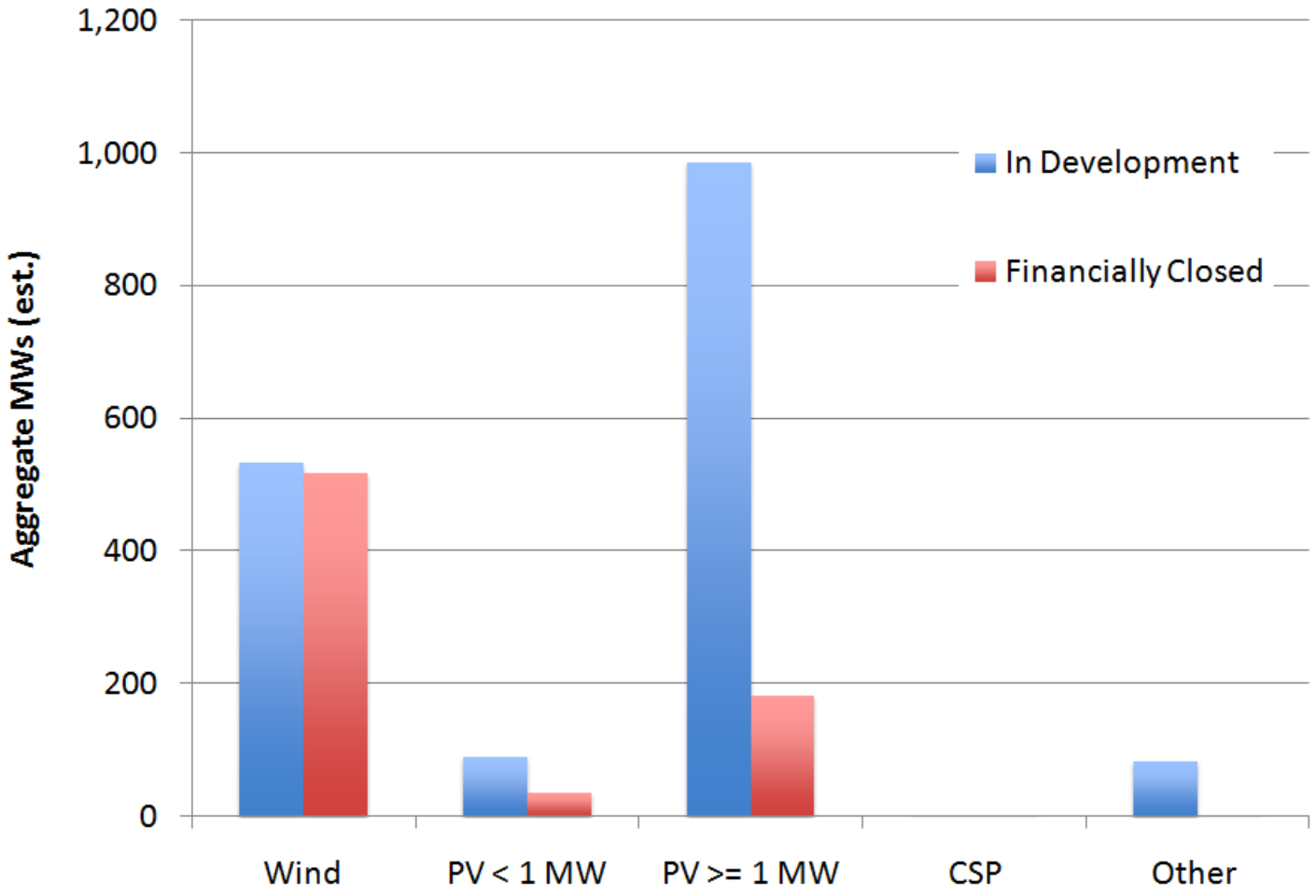
Capacity of Projects Reported (MWs)



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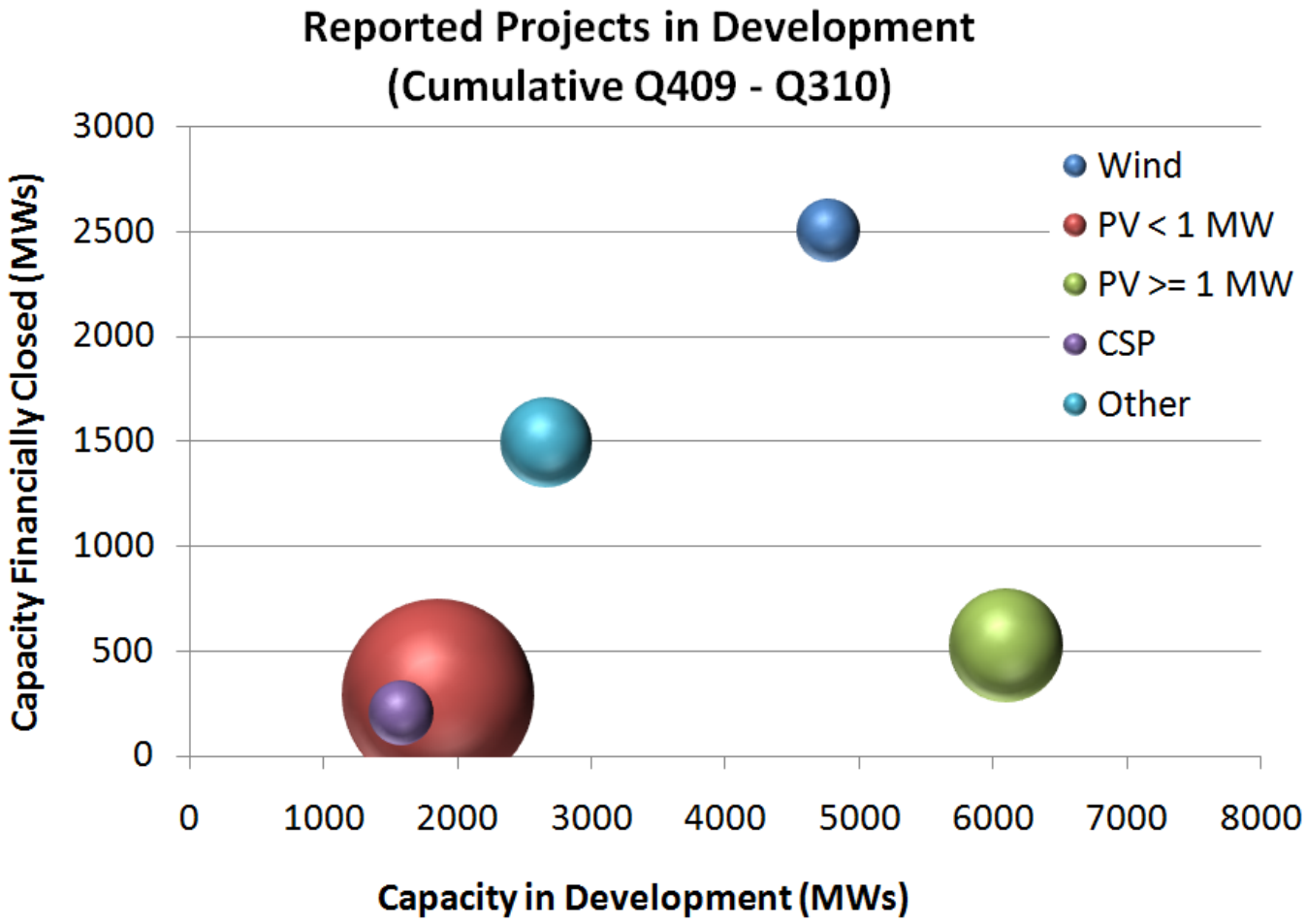
Roughly 1,692 MW in development by REFTI participants with 735.25 MW reaching financial closure of some kind.
** Values estimated based on mid-point of questionnaire bins

Projects Development Reported via REFTI



During last 4 quarters of REFTI, participants reported 5,000 MW of wind in development and 2,500 MW closed financially. Large PV had 6,000 MW in development, but only 500 MW closed financially

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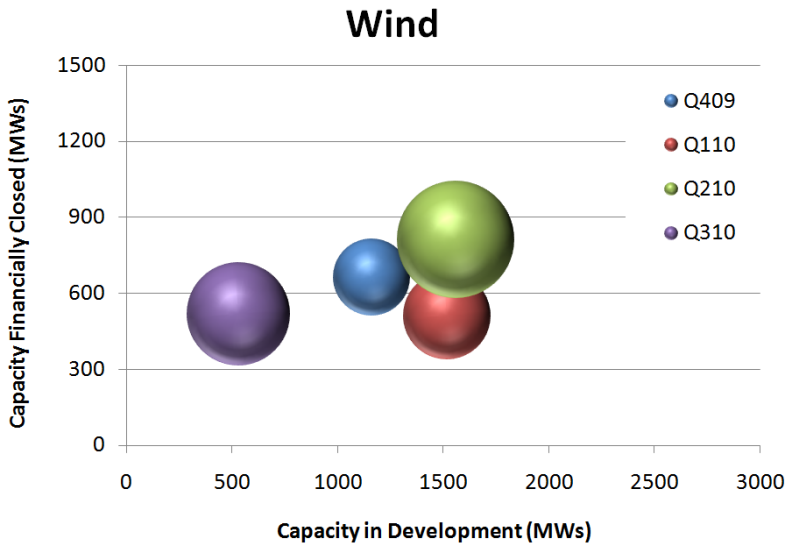
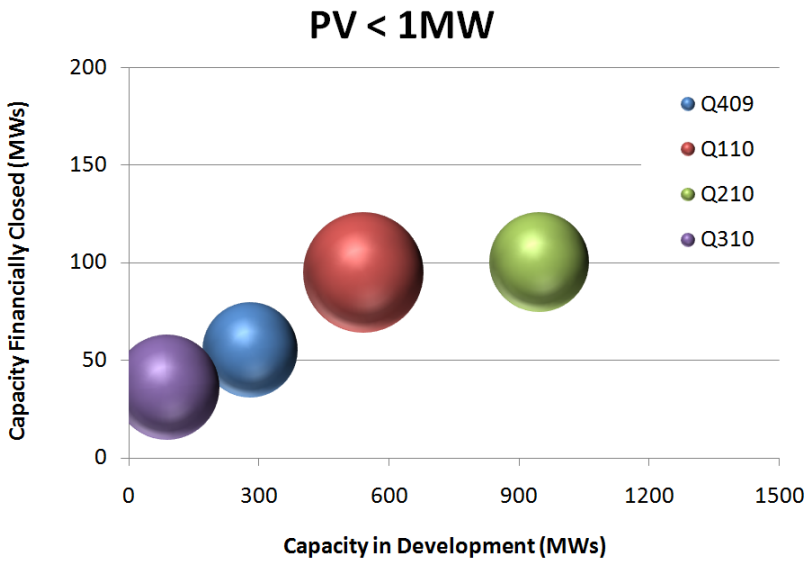
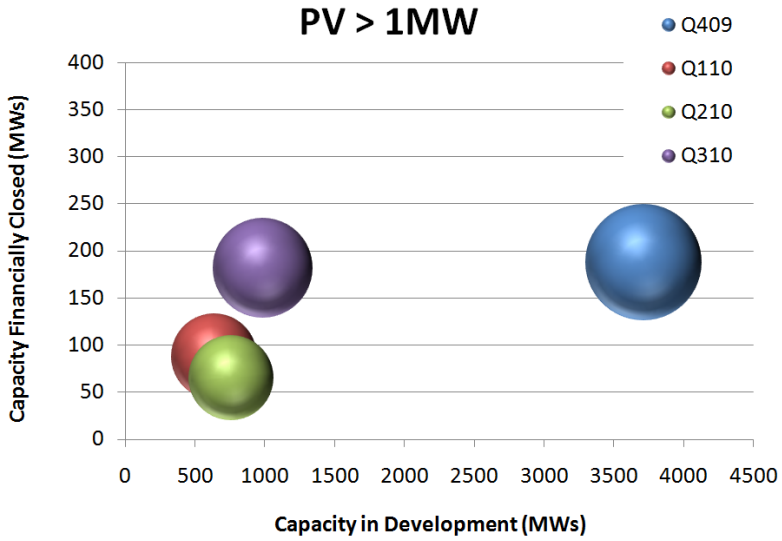
Projects in Development - Trend





Capacity and financings reported via REFTI down in Q3 '10



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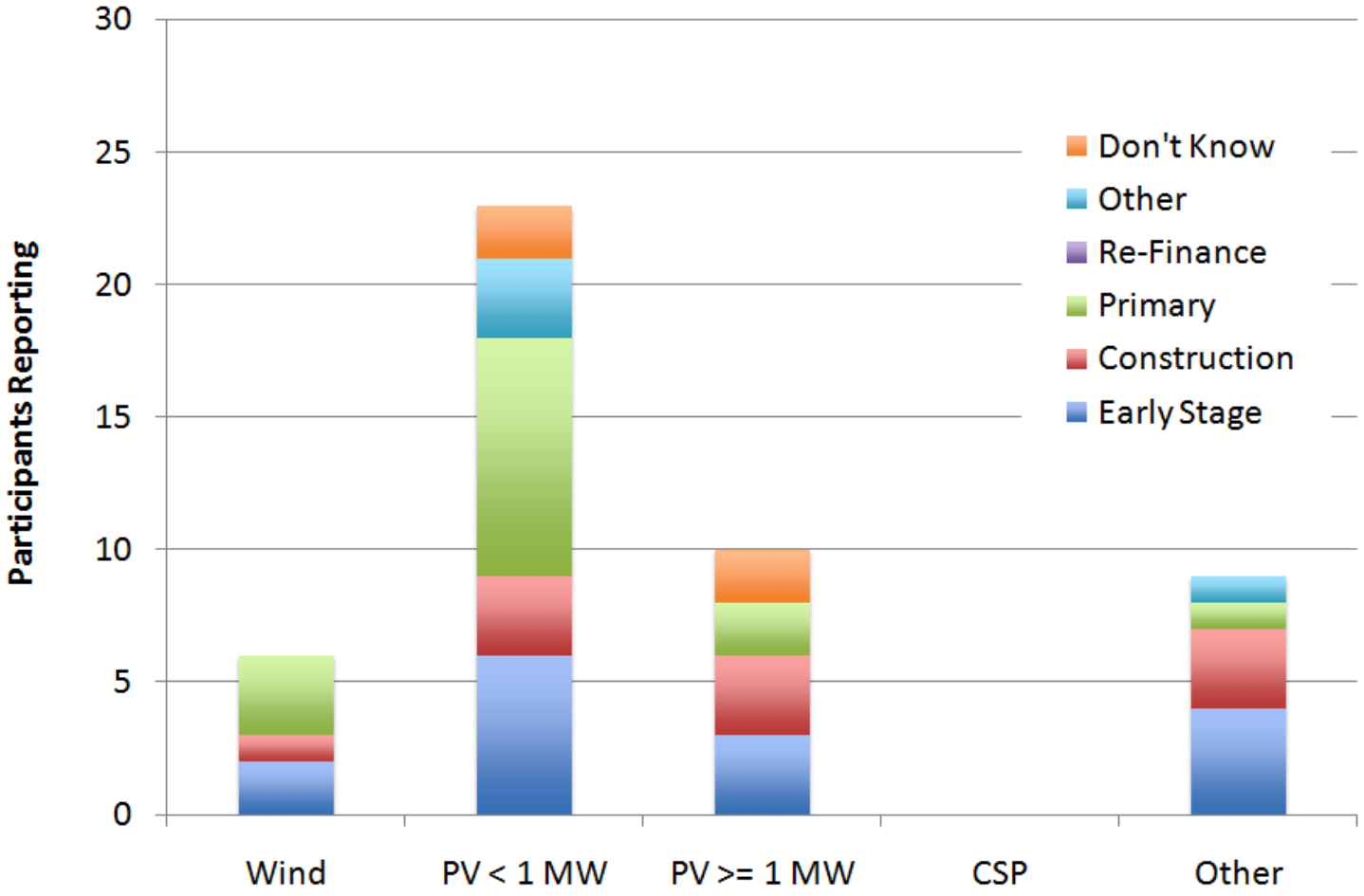
Form of Financial Closure



48 respondents indicated form of financial closure. Primary and early stage financing most commonly reported

REFTI Questionnaire: Q4

4. For projects that closed in Q3 2010, please tell us the PRIMARY LOCATION, POWER PURCHASER, and the TOTAL and DIRECT INVESTMENT...

***** Note: new $ bins *****

	Primary Region	Primary Power Purchaser (i.e., Power Sold To)	Total Cost of Combined Projects ($ millions)	Your Total Direct Investment ($ millions)
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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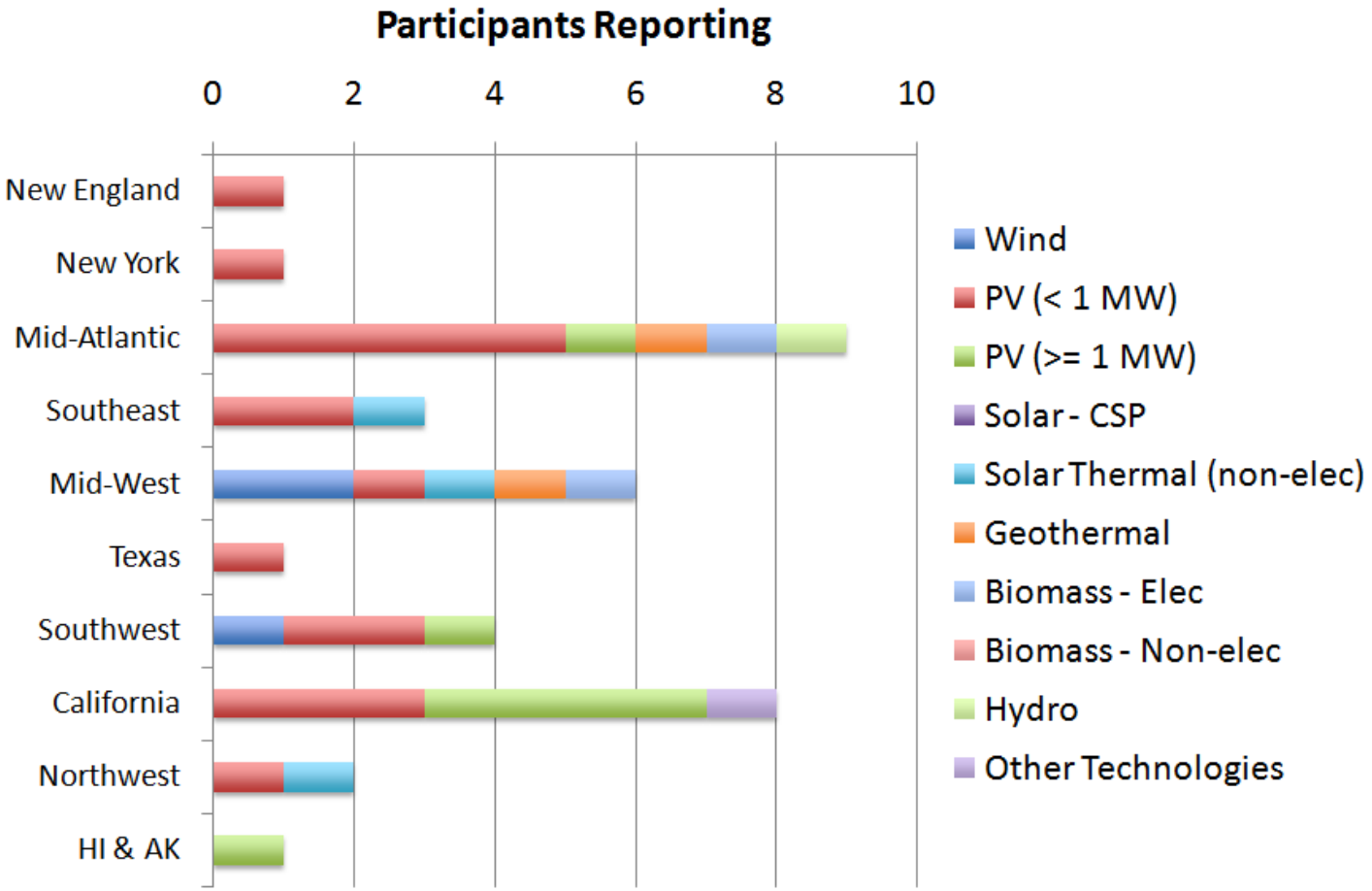
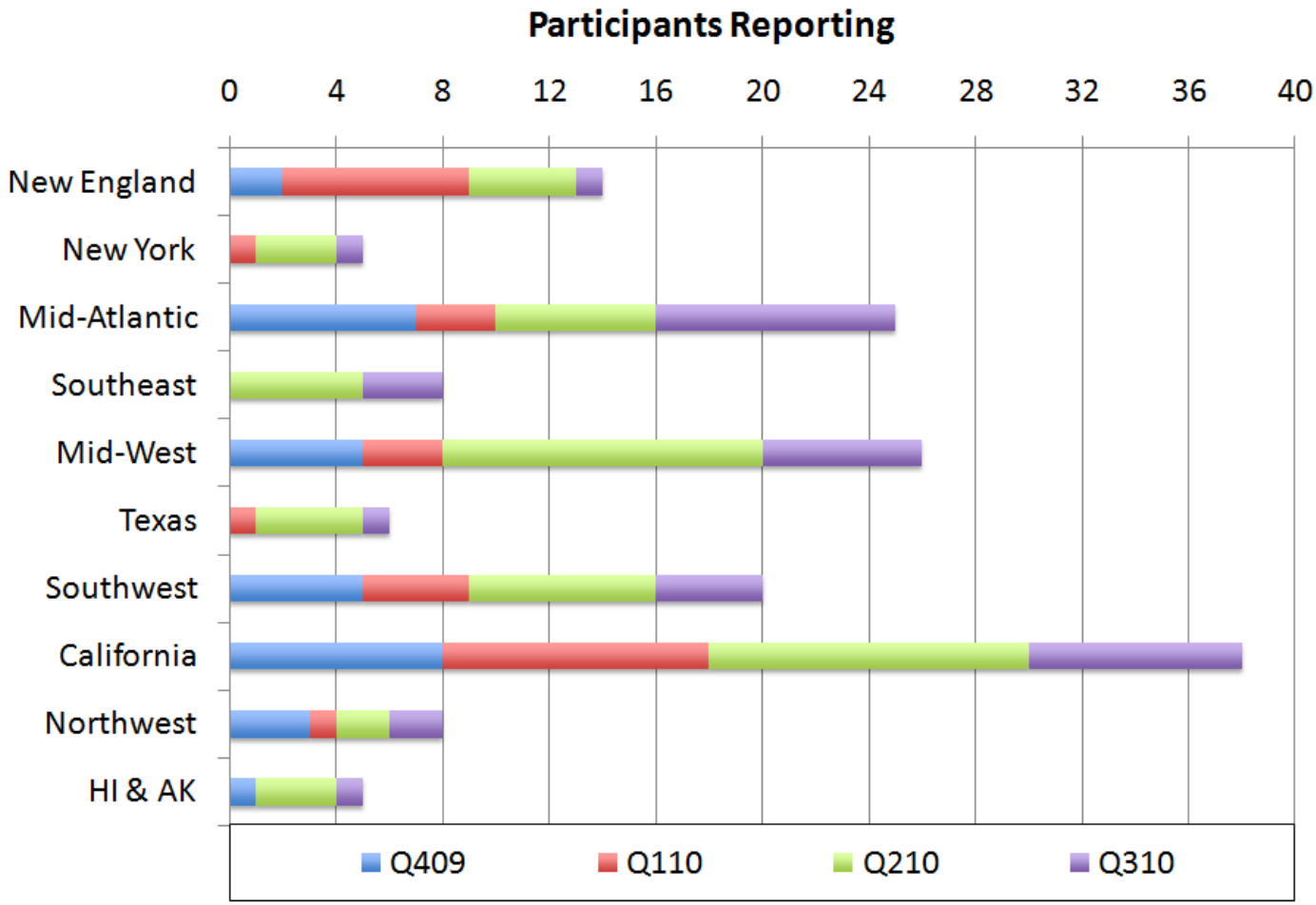
Financial Closures by Region



High number of REFTI participants reporting on projects in Mid-West and CA. All regions represented (59 total participants).

Financial Closures by Region – Trend



Across last 4 quarters, CA holds most projects; Mid-West and Mid-Atlantic also leading in representation

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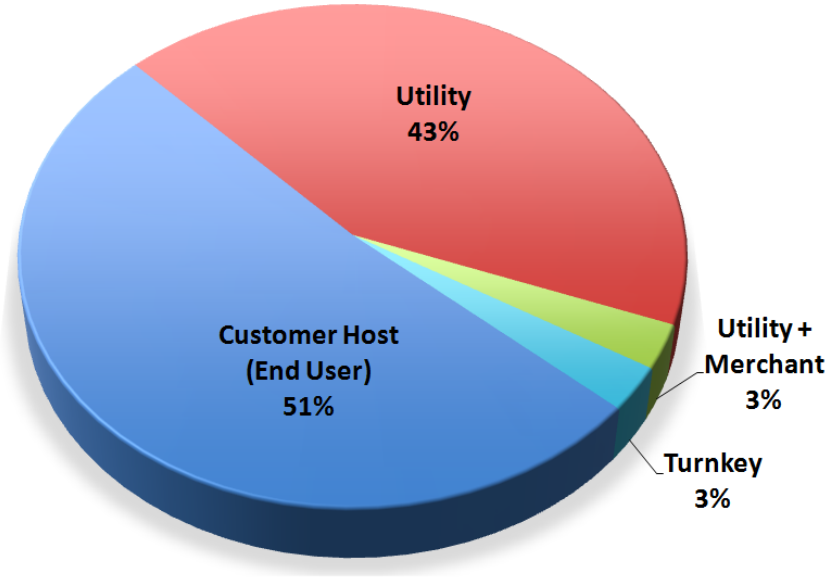
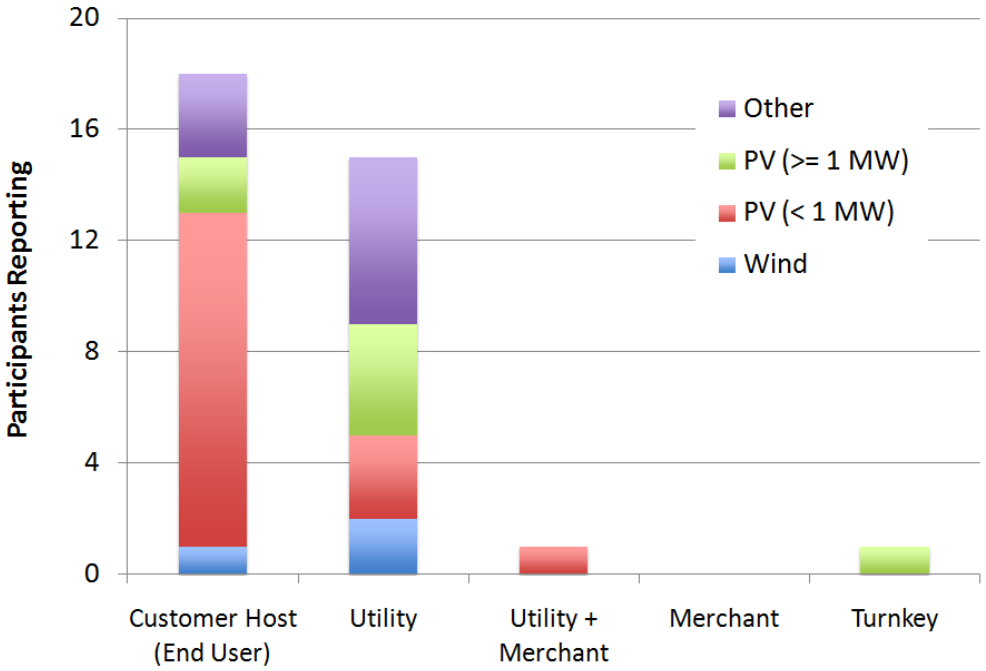
Primary Power Purchaser





Most projects reported signed PPA with customer host. Essentially no merchant sales reported

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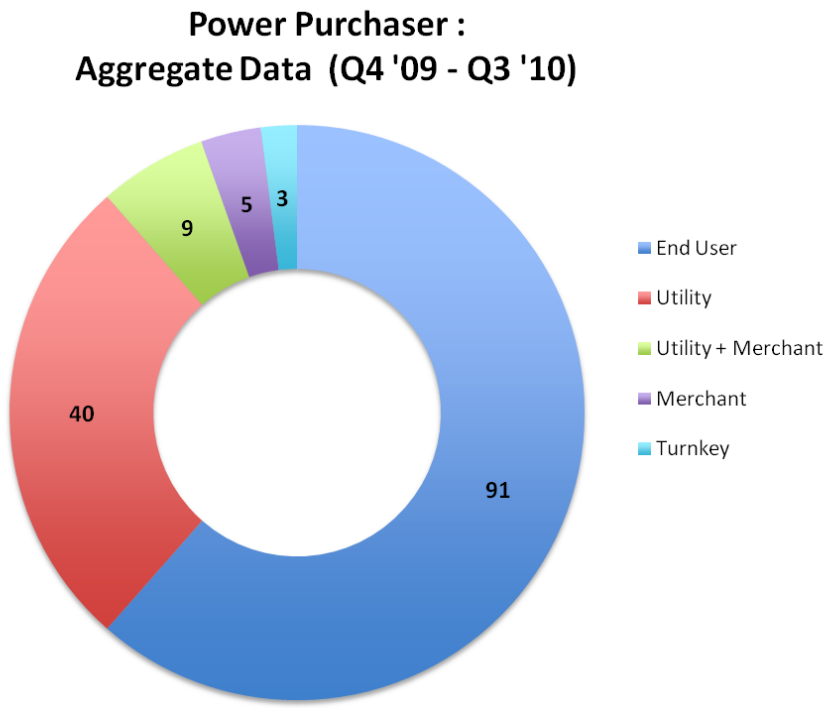
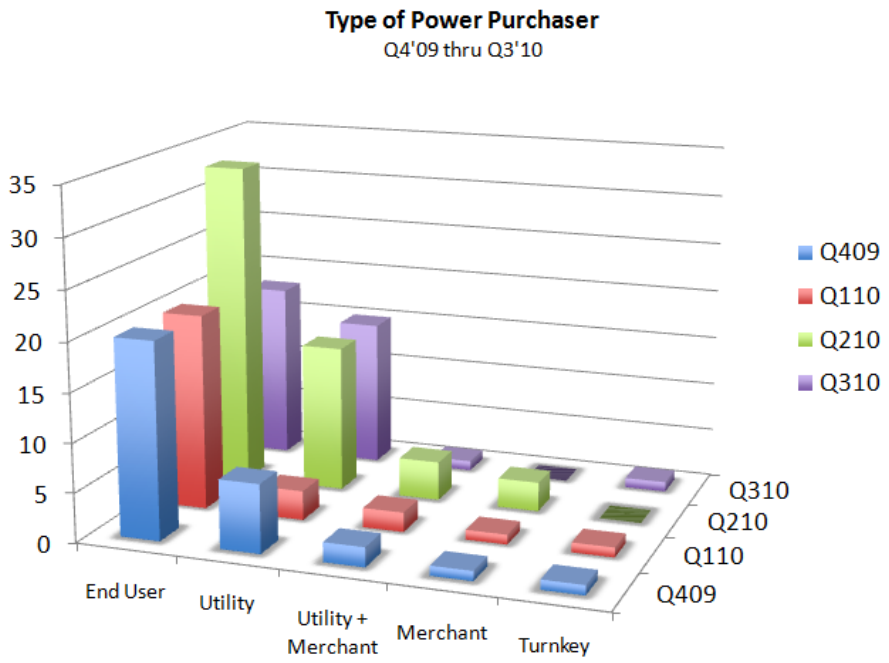
Primary Power Purchaser – Aggregate & Trend





Most projects reported signed PPA with customer host. PPA with utility second most common transaction type

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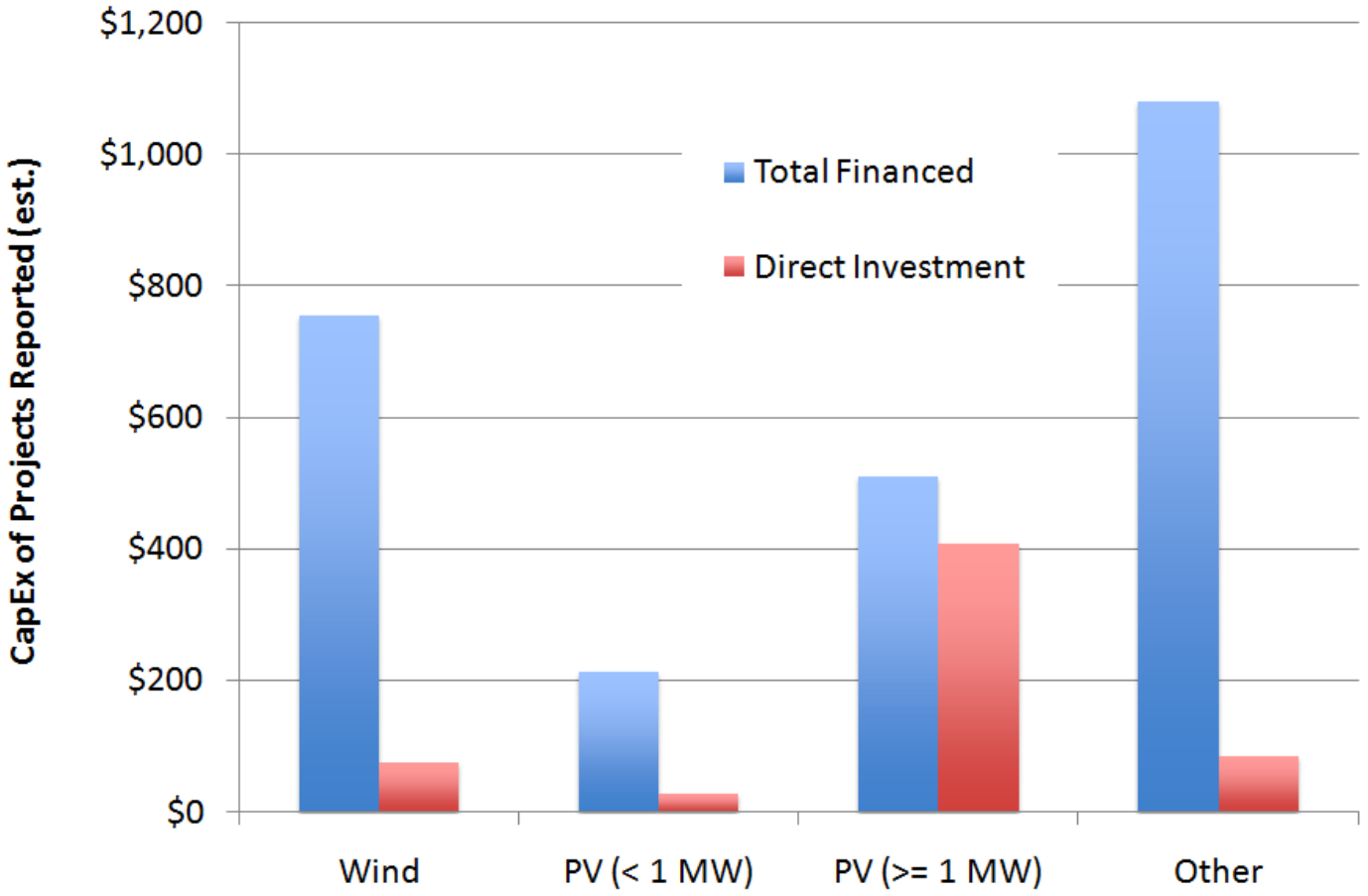
Capital Expenditure Reported ($MM)



REFTI participants reported $2.56B in projects in development, $596.4M of direct finance coming from REFTI participants.
** Values estimated based on mid-point of questionnaire bins

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REFTI Questionnaire: Q5

5. For your projects that are BEHIND-THE-METER, please tell us about the customer host (end user)...

	Number of Deals	Nameplate Capacity (aggregate MW)	Typical Customer Financing Structure	Avg. Customer Payback (yrs)	Avg. Customer Discount Rate (%)
Residential					
Commercial & Industrial					
Federal Government					
State & Local Govt.					

Comments

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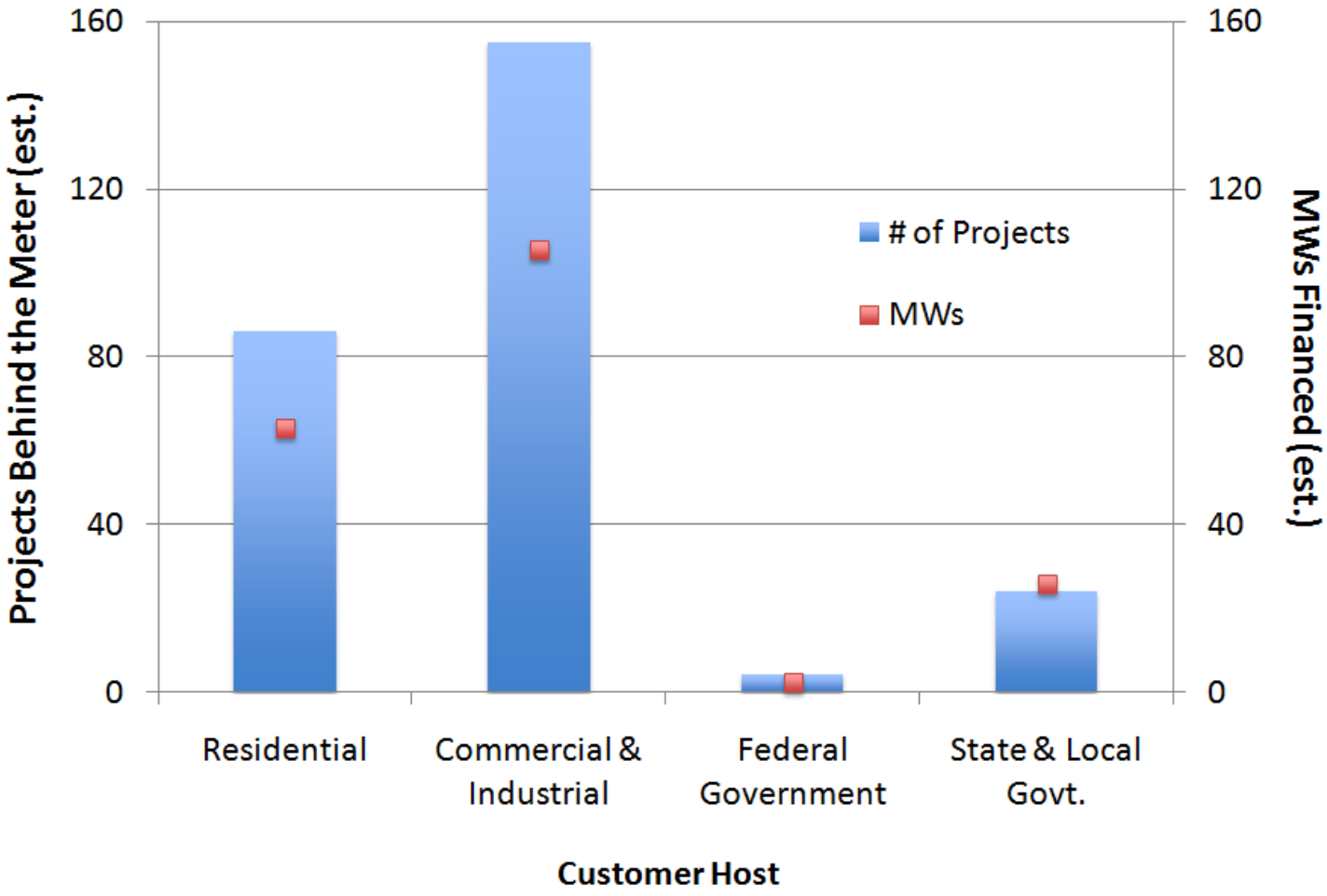
No. & MWs of Projects with Customer Host



Roughly 269 projects, representing 196.9 MW, reported with customer host. ** Values estimated based on mid-point of questionnaire

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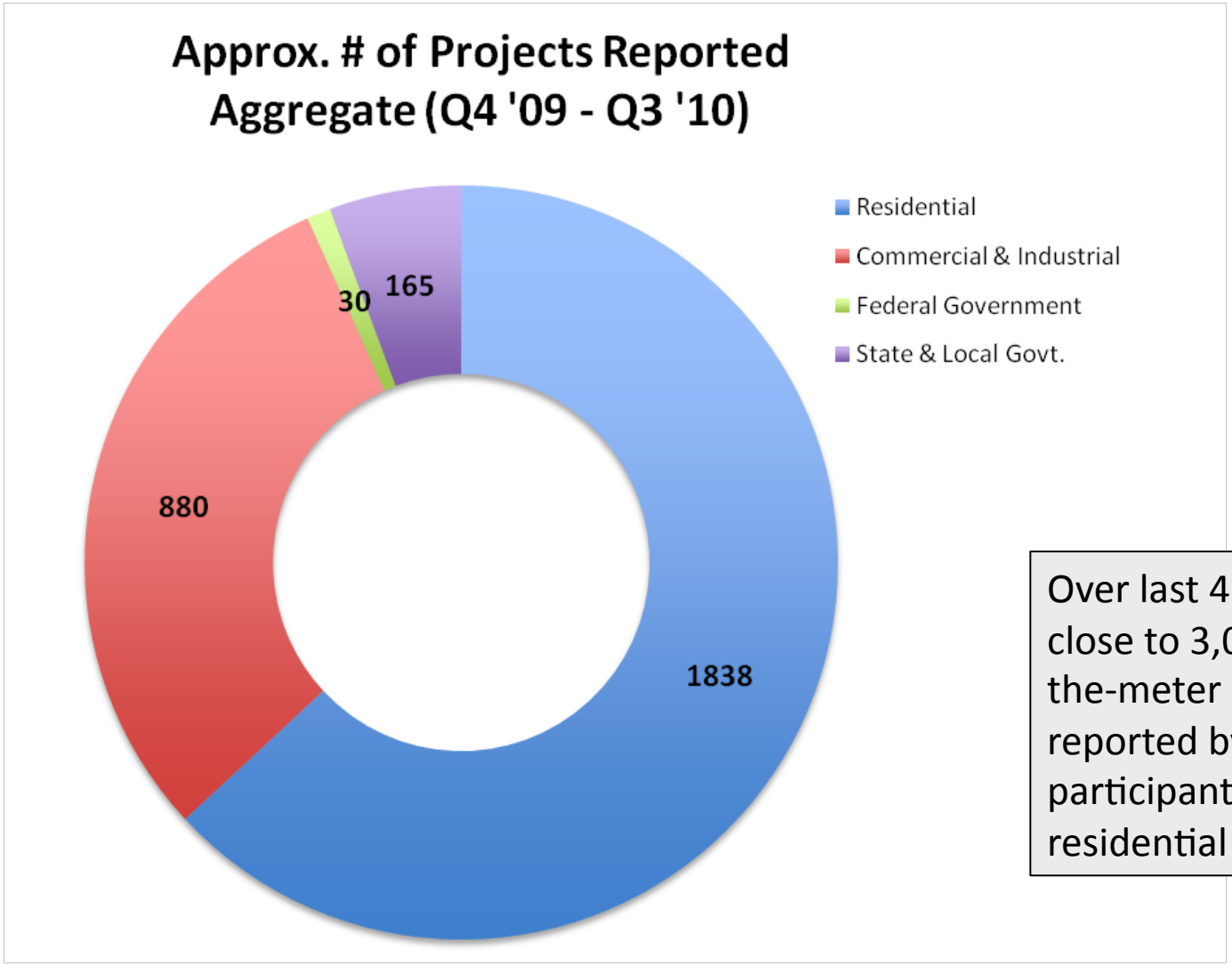
Behind-Meter Projects by Sector - Aggregate



Over last 4 quarters, close to 3,000 behind-the-meter projects reported by REFTI participants, almost 2/3 residential

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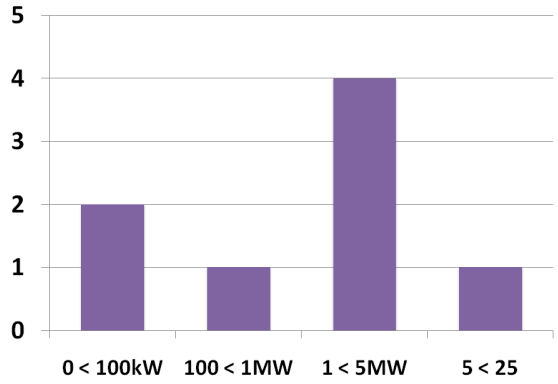
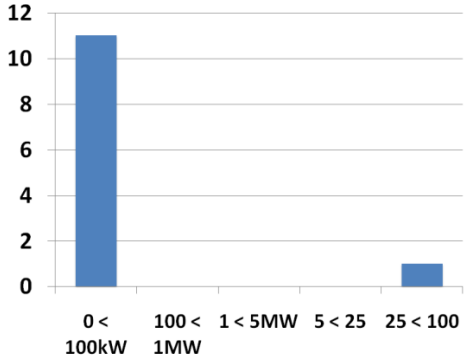
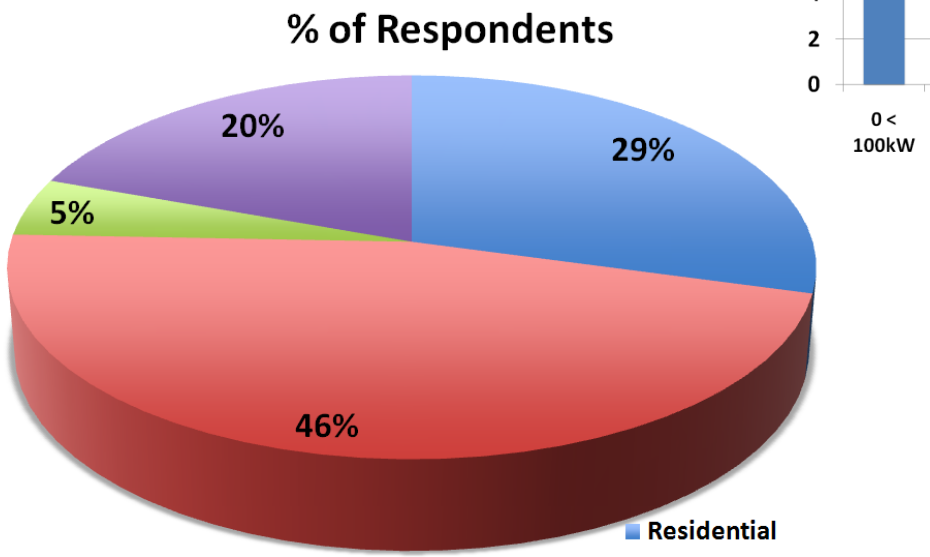
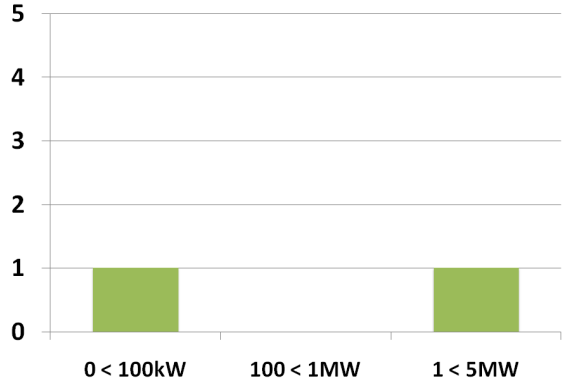
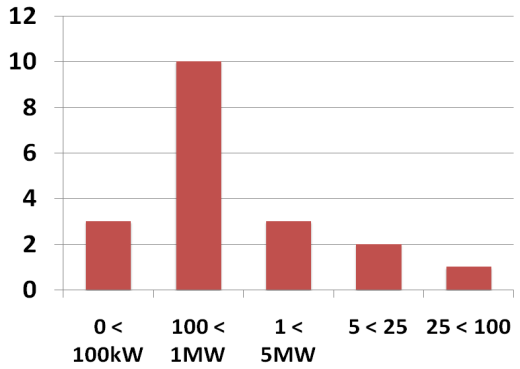
Capacity of Projects with Host (MWs)











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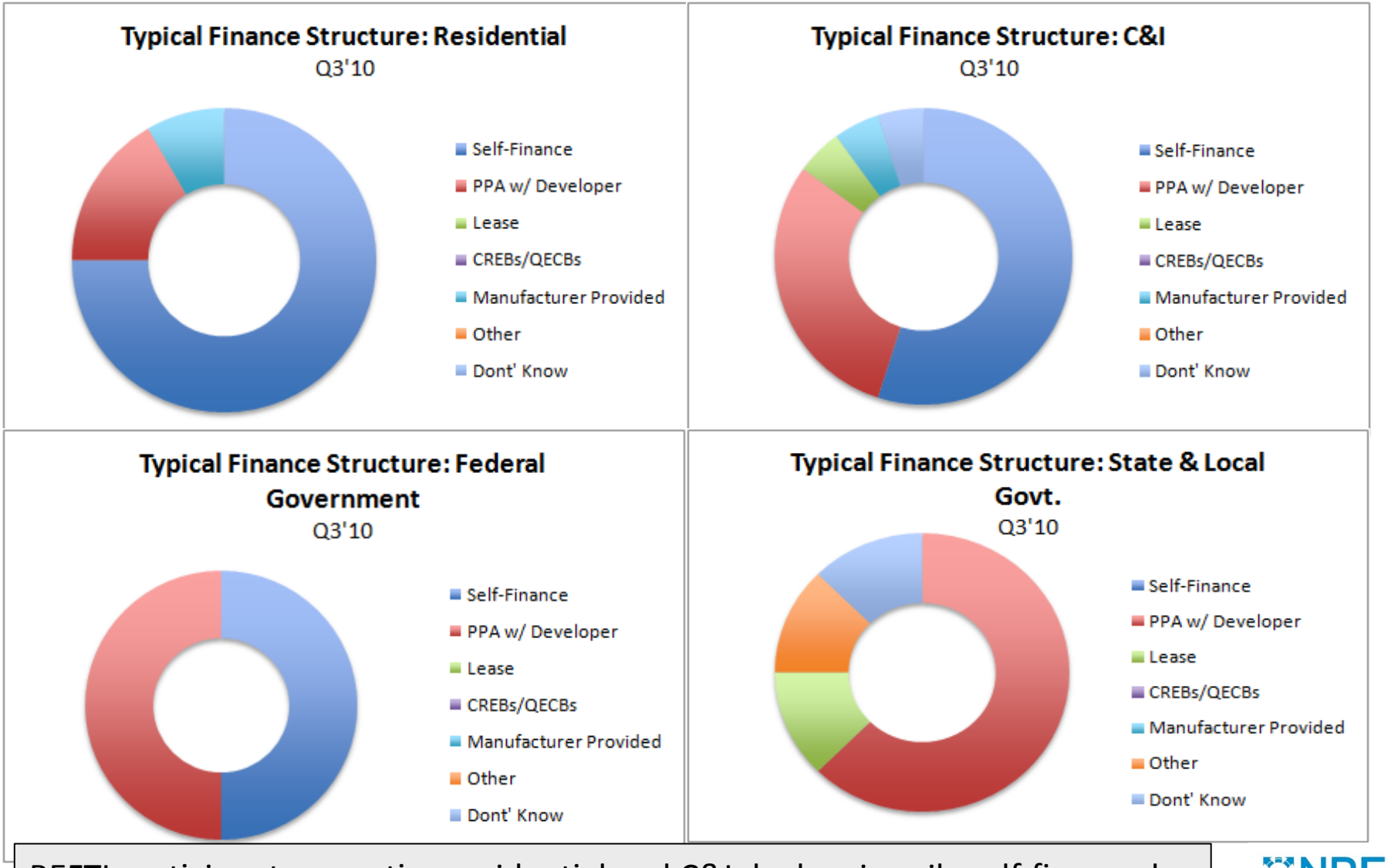
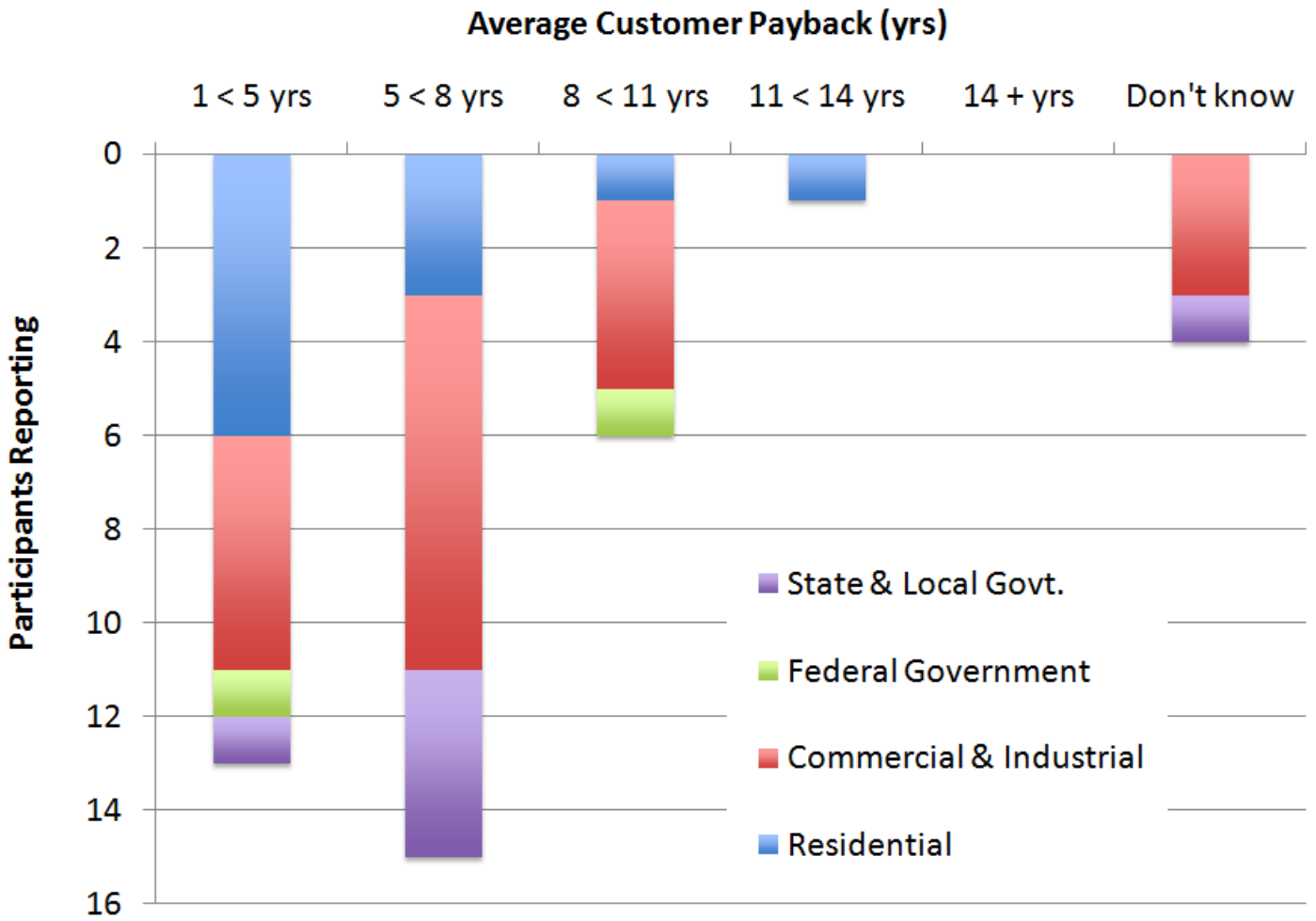
Form of Customer Host Financing



REFTI participants reporting residential and C&I deals primarily self-financed

Customer Host Payback (Yrs)



Most projects have payback less than 8 years. Very wide range on residential deals (likely tied to utility power price and REC purchase). State & local projects reporting narrower range

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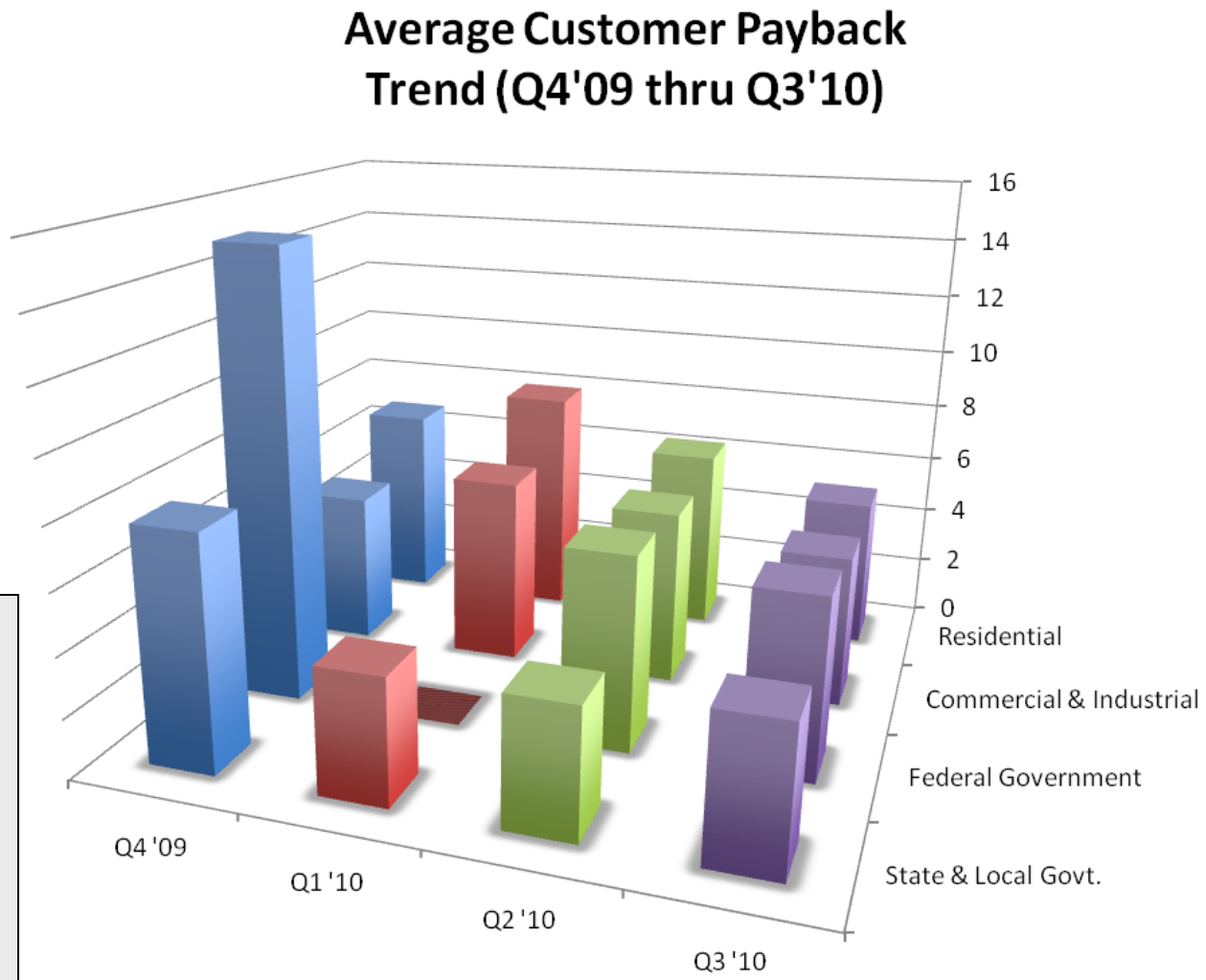
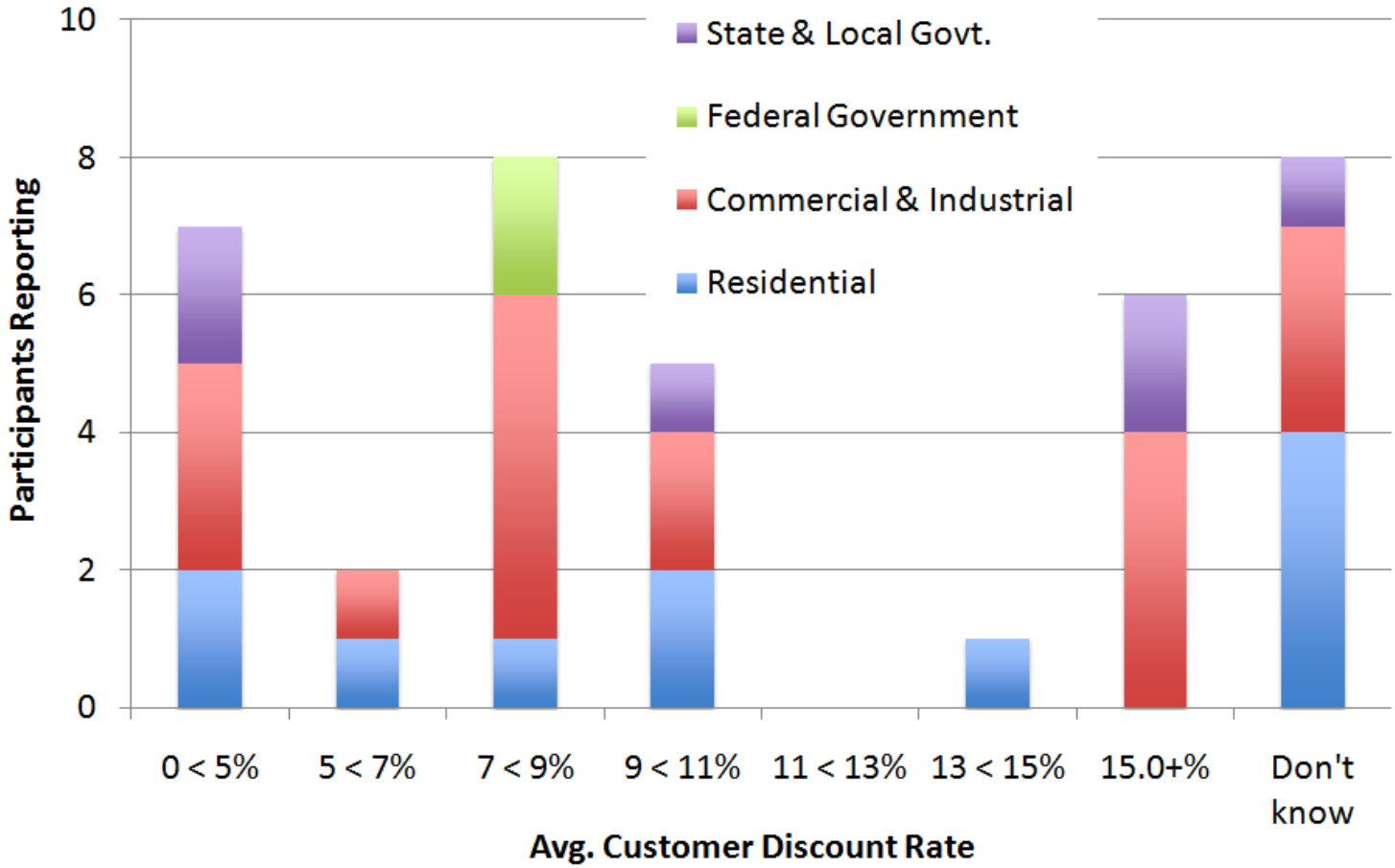
Customer Host Payback – Trend Analysis



Customer payback appears to be declining (i.e., improving) across all customer sectors, particularly governmental

Customer Host Discount Rate



Customer discount had very broad range this quarter (was tighter in prior quarters). Fairly high "don't knows" as expected

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REFTI Questionnaire: Page 2, Q4 (Q6)

6. What was the LARGEST BARRIER to RE project development and how did it impact your projects

	Barrier	Impact
Wind		
Solar - PV (< 1 MW)		
Solar - PV (>= 1 MW)		
Solar - CSP		
Solar Thermal (non-elec)		
Geothermal		
Biomass - Elec		
Biomass - Non-elec		
Hydro		
Other Technologies		

Comments

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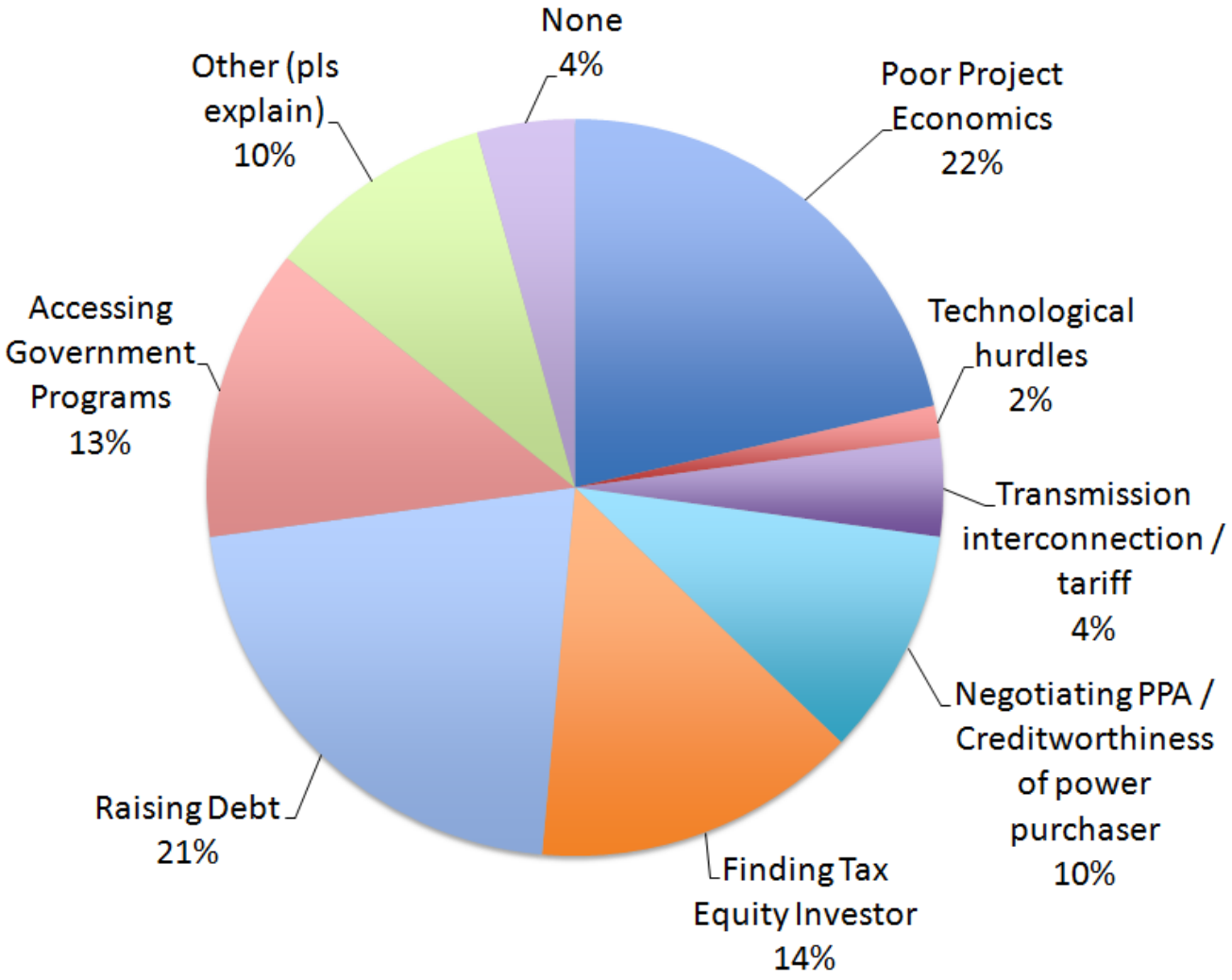
Largest Barriers to RE Development

About 45% of respondents referenced financing-related barrier as most significant; Poor project economics (added in Q3 2010) makes up significant fraction



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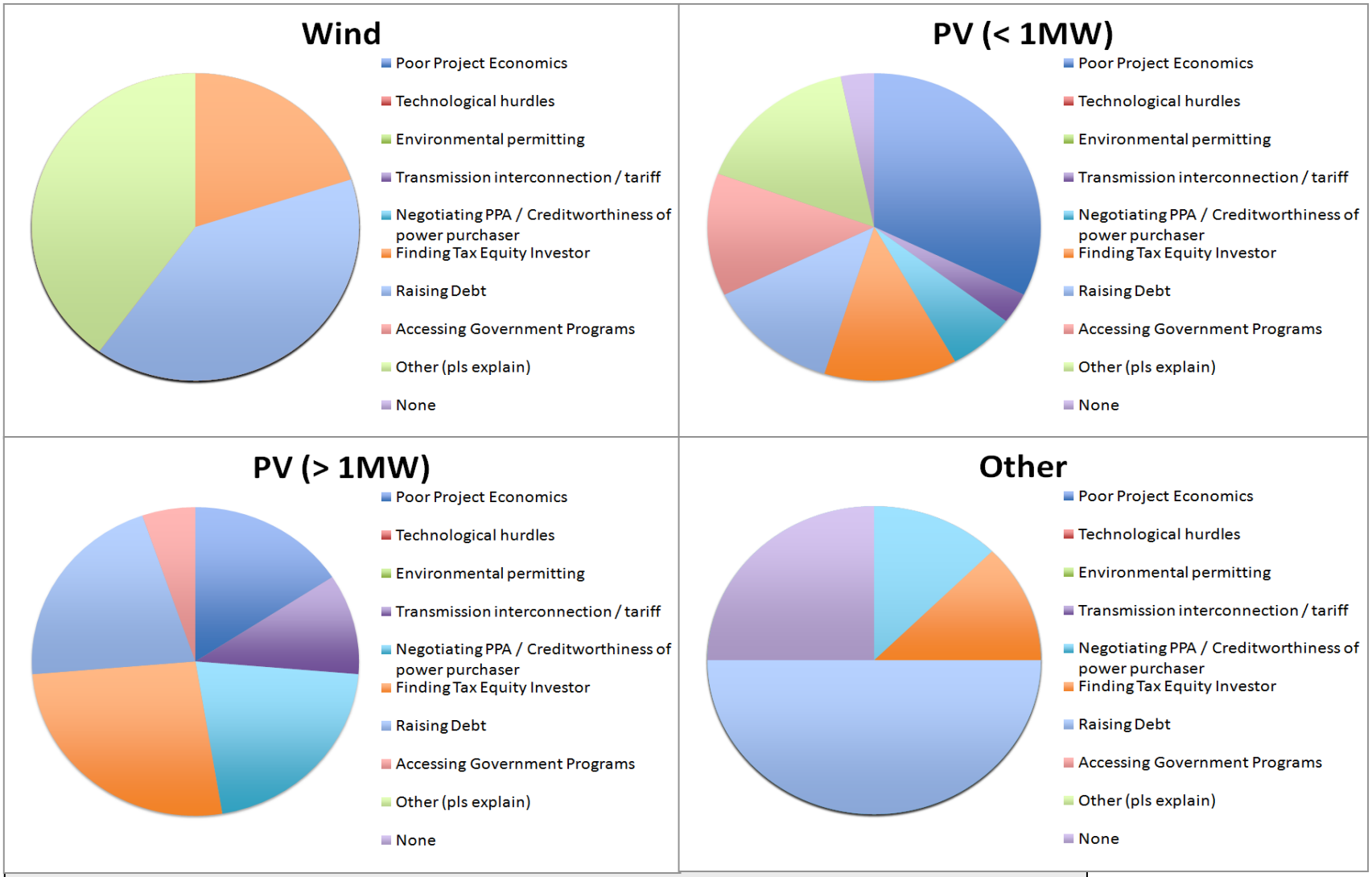
Largest Barriers – Tech Breakout



Large PV and wind mentioned finding tax equity, raising debt as issues; small PV dominated by poor project economics

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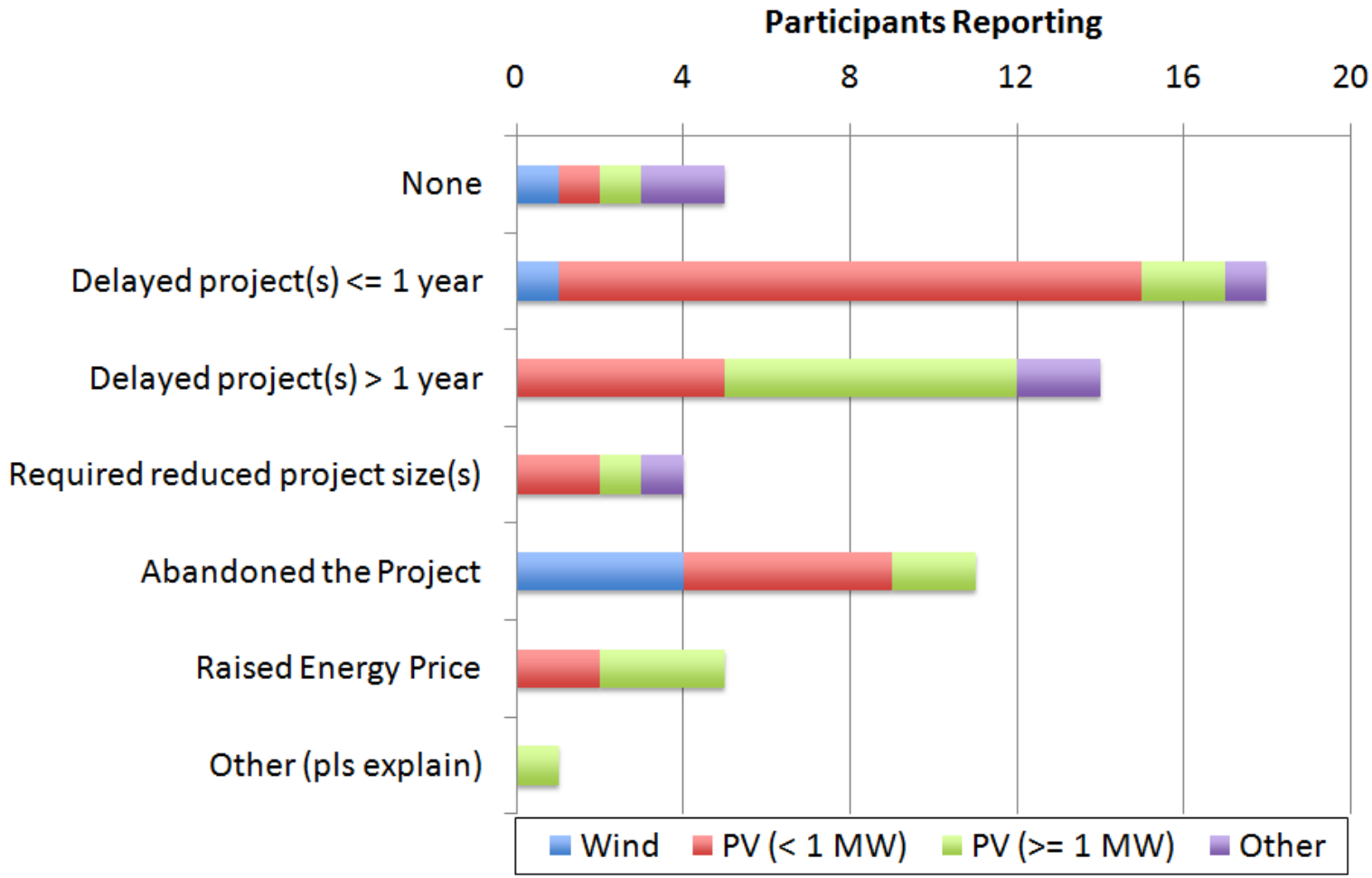
Consequence of Development Barrier(s)



Very few projects indicate no consequence to development barriers. Short-term delays (<1 year) most common consequence.

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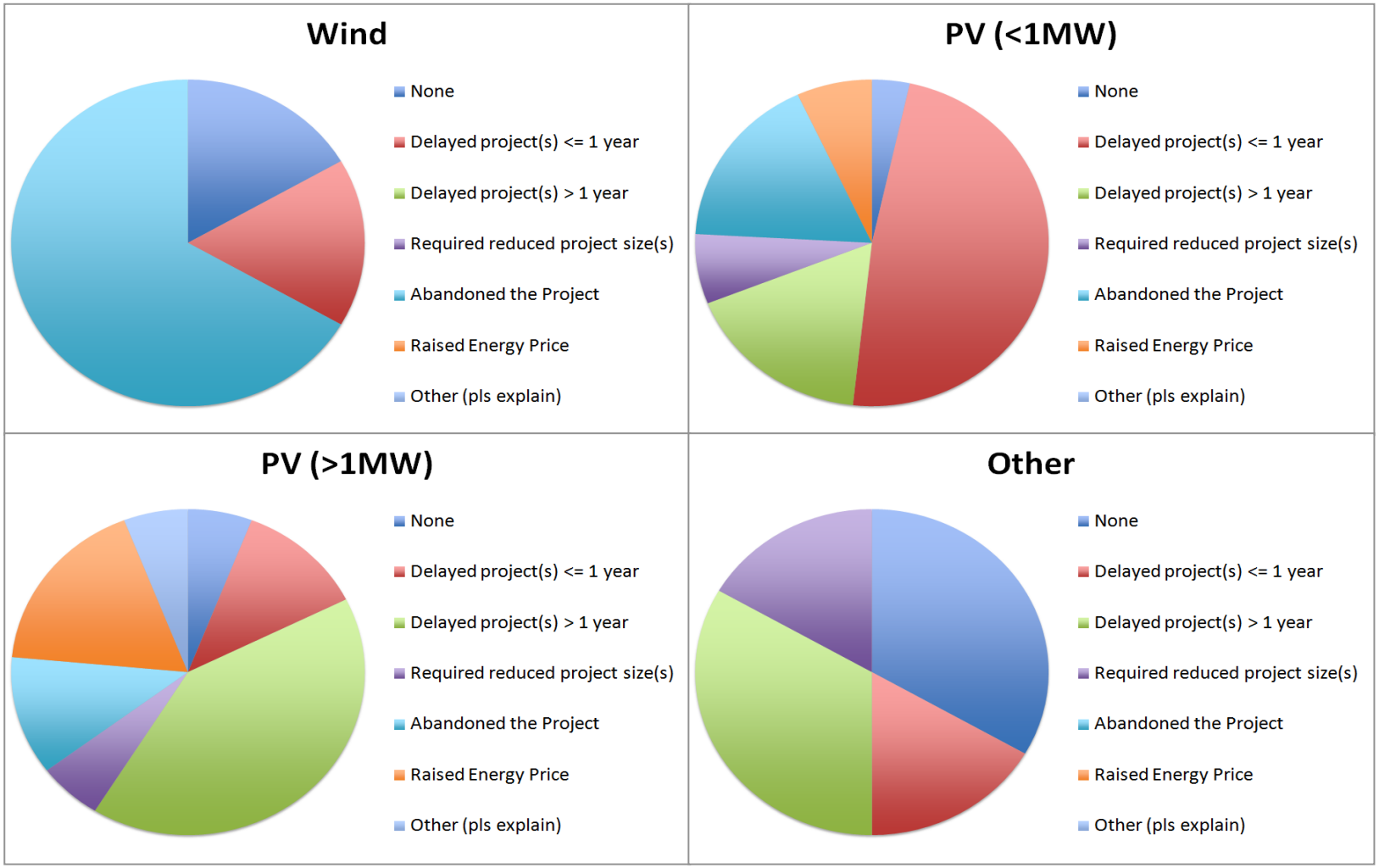
Consequence of Barriers – Tech Breakout



Large PV has longer delays, wind referenced high project abandonment; small PV projects have shorter delays

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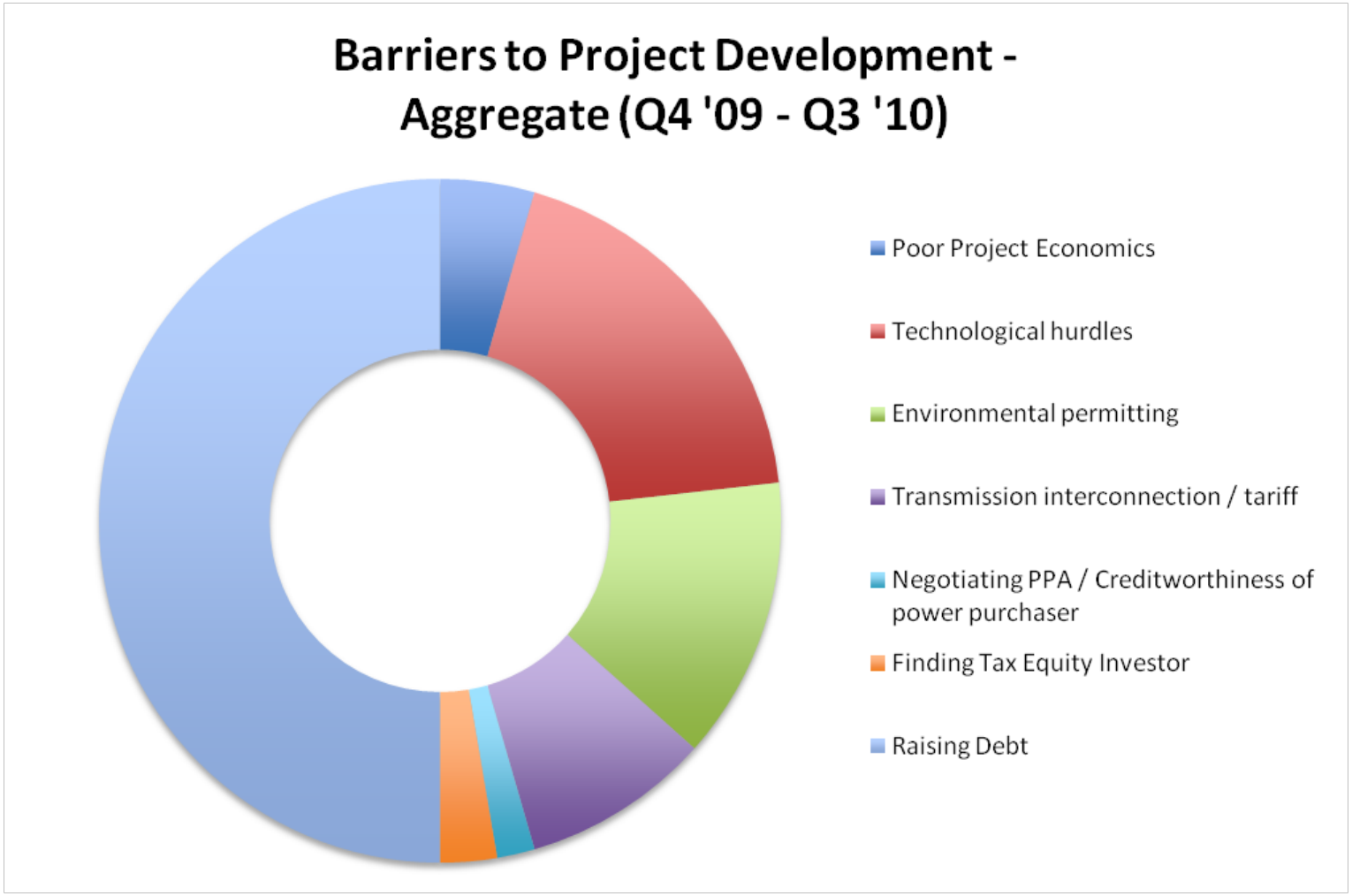
Development Barriers – Aggregate



Over last 4 quarters, raising debt has been number one development barrier referenced by REFTI participants

REFTI Questionnaire: Q7 (p. 3 – Financing)

7. Select the primary typical FINANCIAL STRUCTURE characteristics of your projects that closed in prior quarter...

	Financial Structure	Depreciation	Federal Incentive	State Incentive
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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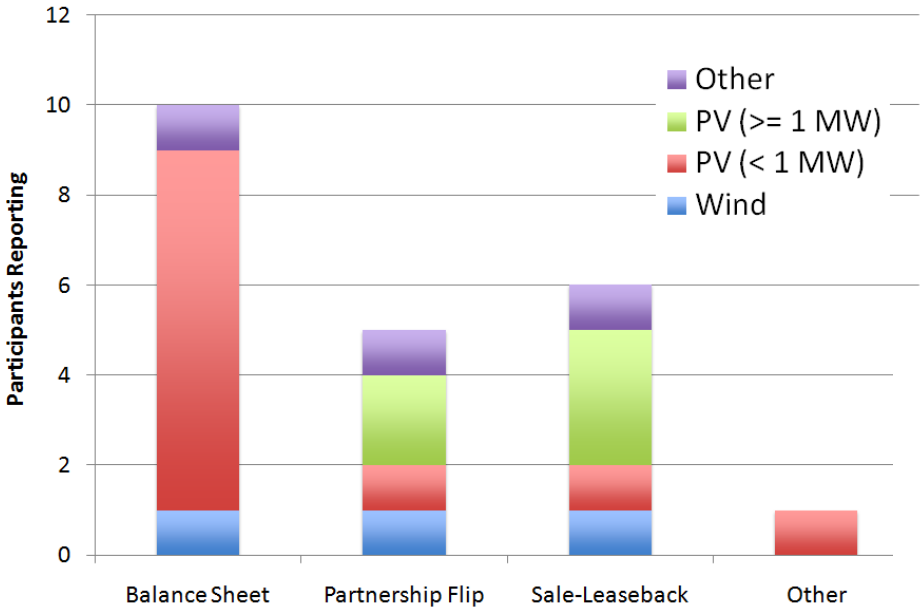
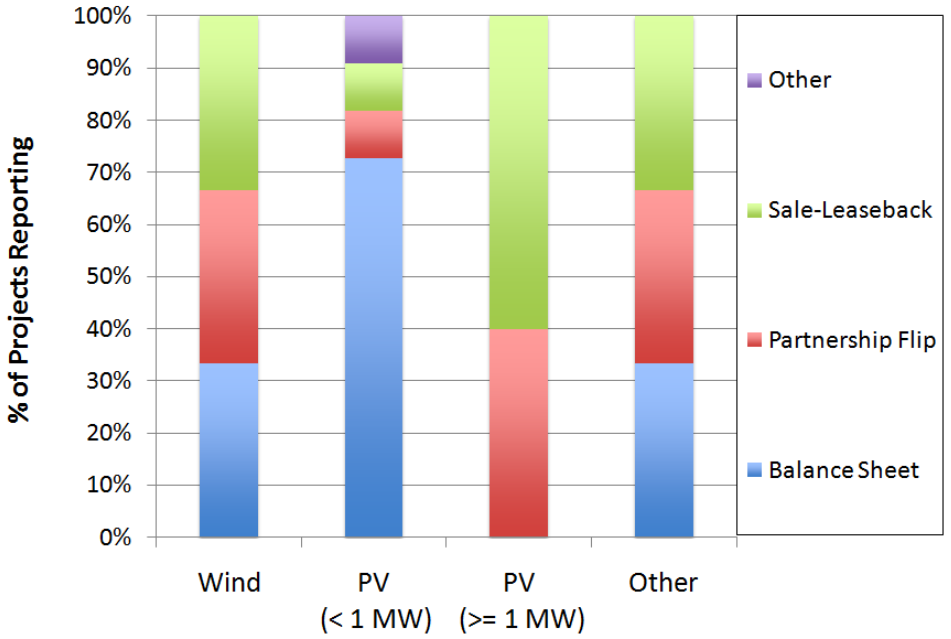
Financial Structure of Projects Reported





Balance sheet finance still critical for smaller projects; partnership flip and lease arrangements more relevant for wind and larger PV

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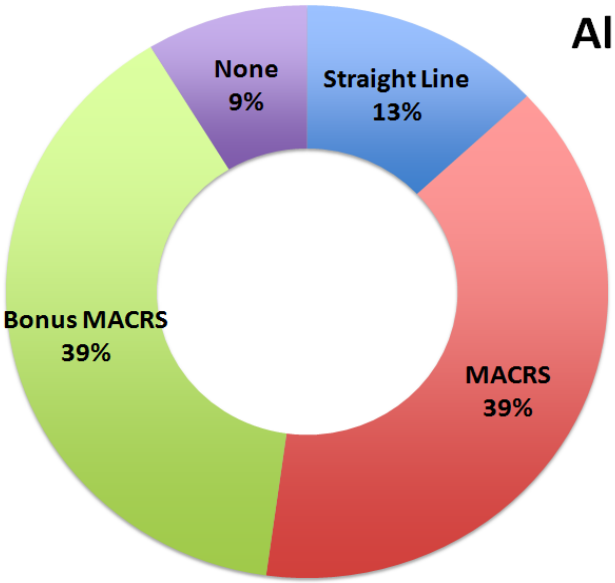
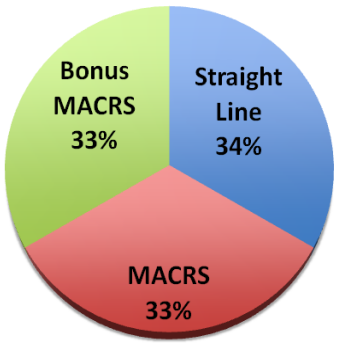
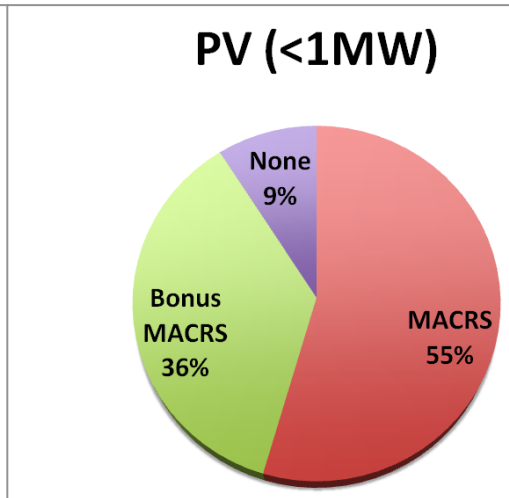
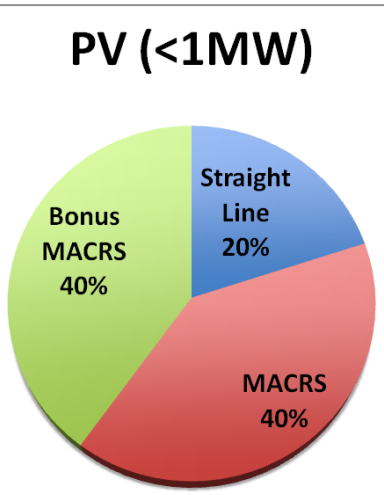
Form of Depreciation Taken



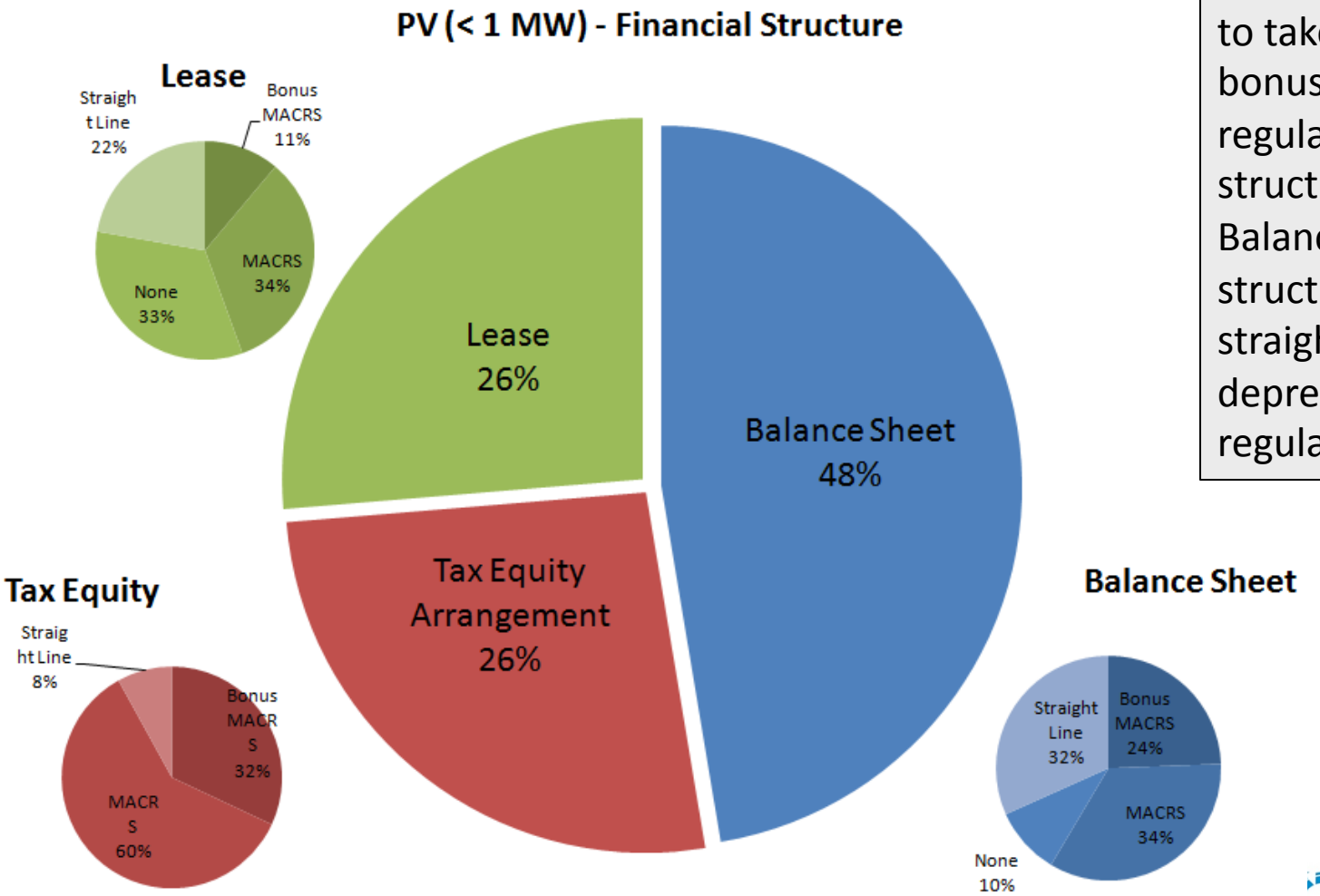
Bonus MACRS and regular MACRS evenly reported. Straight line depreciation reported in 1/3 of wind projects.







Financial Structure / Depreciation



Tax equity flips able to take advantage of bonus MACRS more regularly, lease structures less so; Balance sheet structures relied on straight line depreciation more regularly

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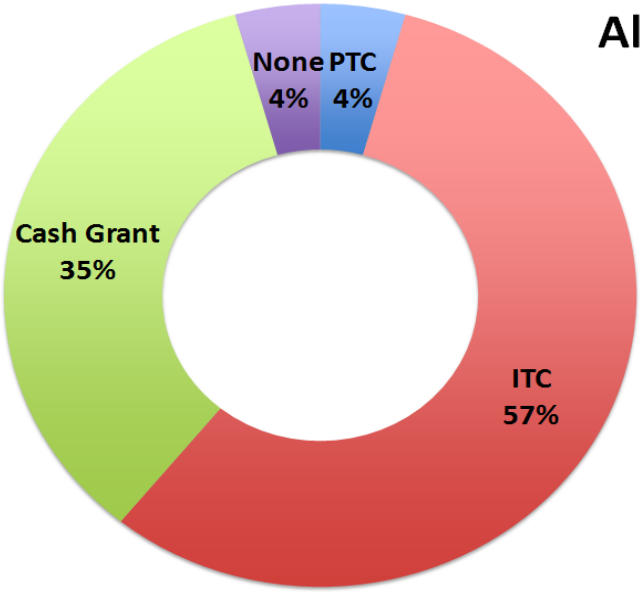
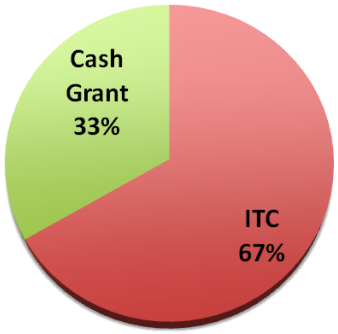
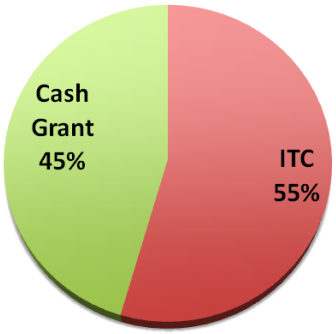
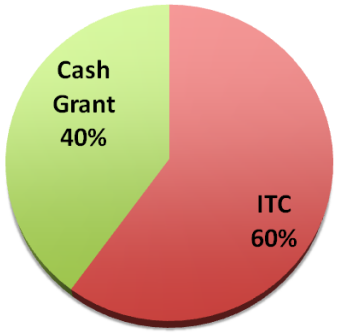
Form of Federal Incentive Taken



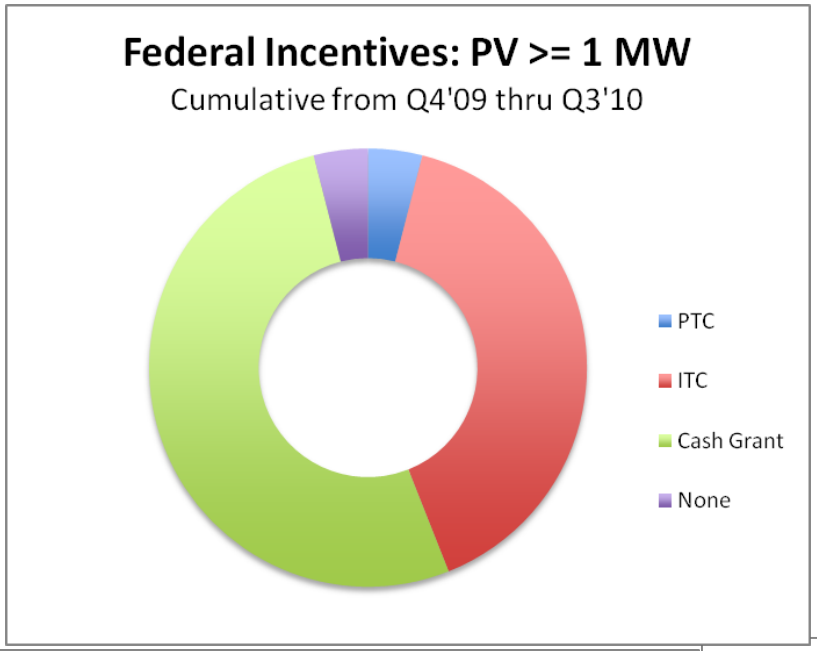
Remarkably, ITC was reported as primary form of federal incentive over cash grant across all major technology sectors



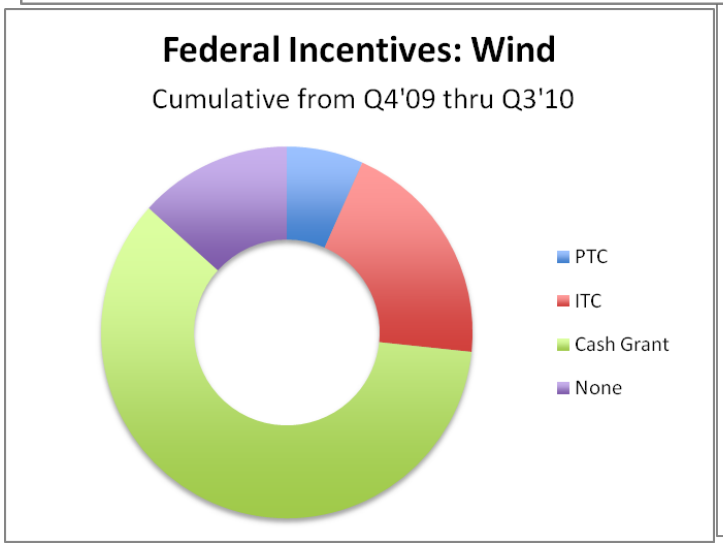


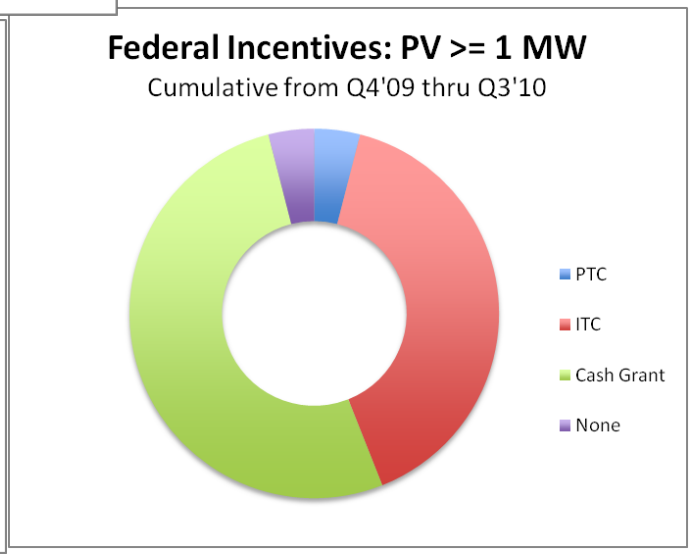


Federal Incentive Taken – Aggregate Analysis

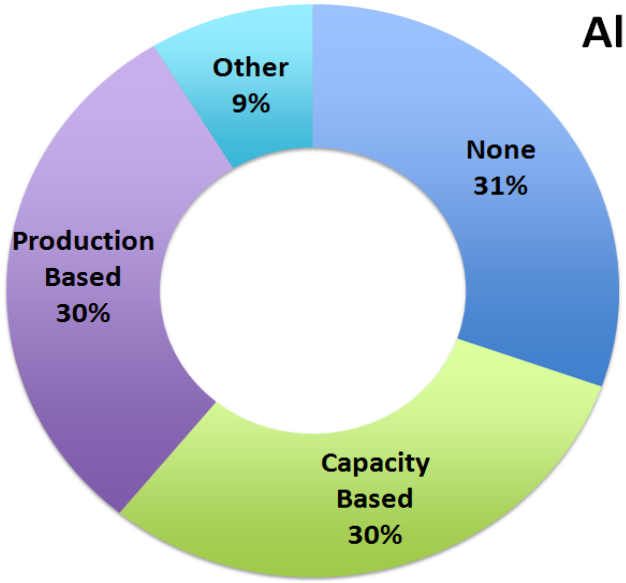


Cash grant represents form of roughly half of the federal incentive taken over last 4 quarters of REFTI

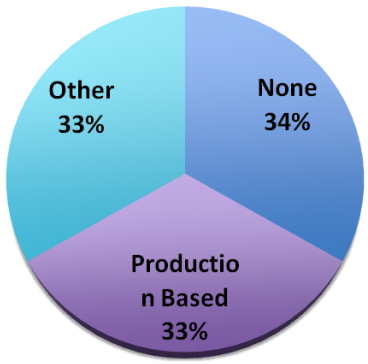


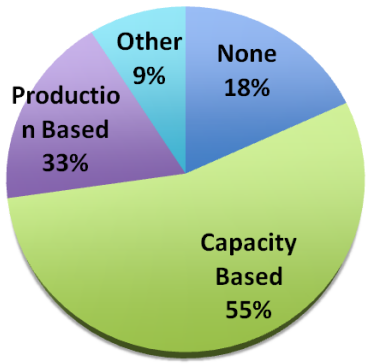


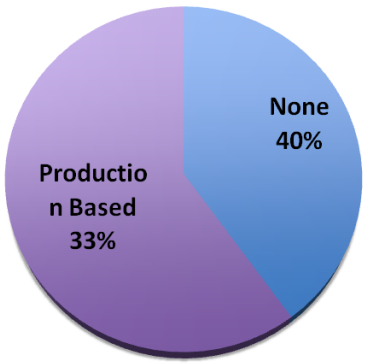
Form of State Incentive Taken



REFTI participants report roughly one third each for capacity-based incentives, production-based incentives, and none

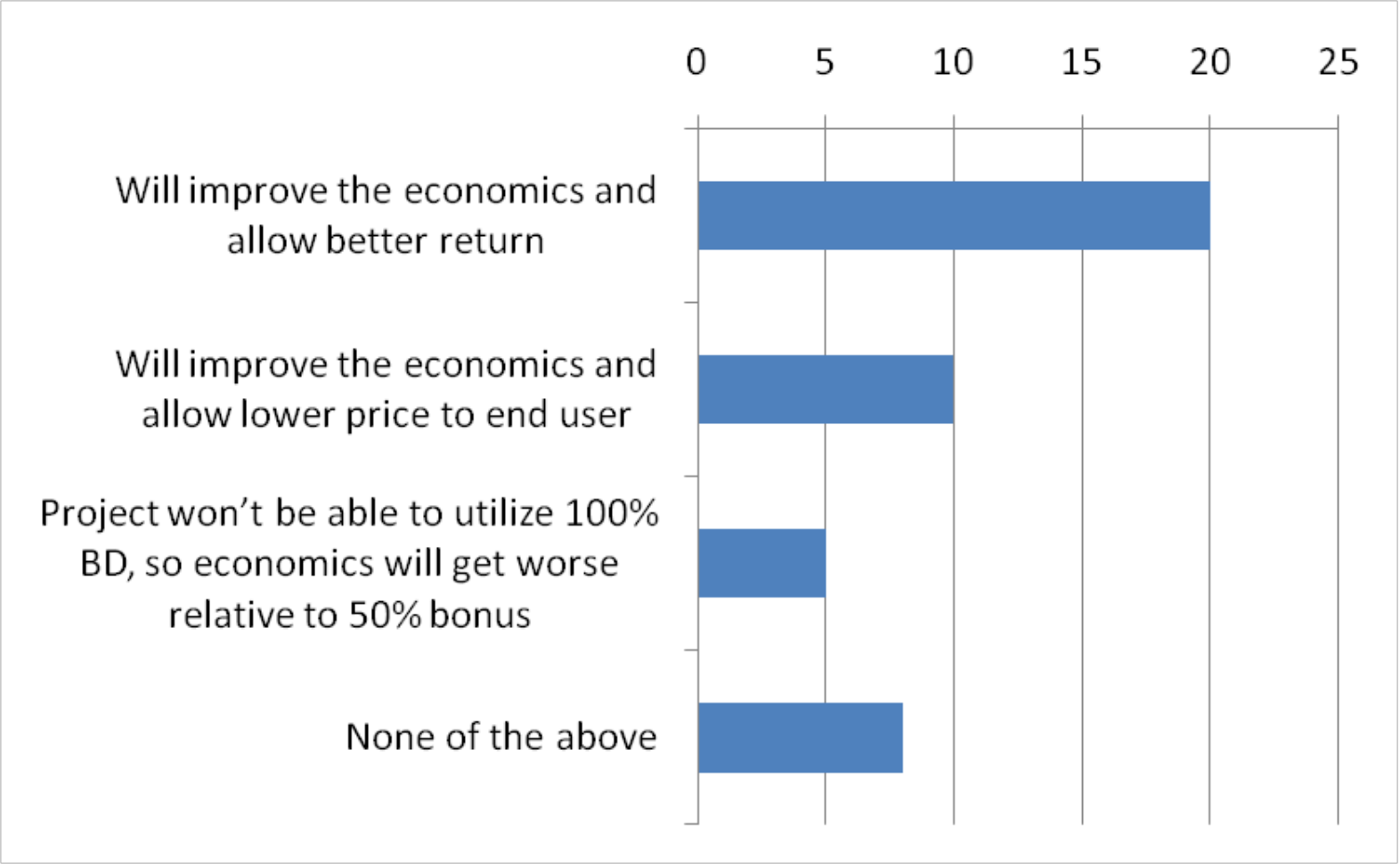






Bonus Question #1:

How will 100% bonus depreciation impact your projects?



REFTI Questionnaire: Q8

8. Provide the typical expected method of REC Sales, REC Type, REC Contract Duration, and REC-only price (if applicable) by technology...

	REC Sales	REC Type	REC Contract Term (yrs)	REC-only Price ($/MWh)
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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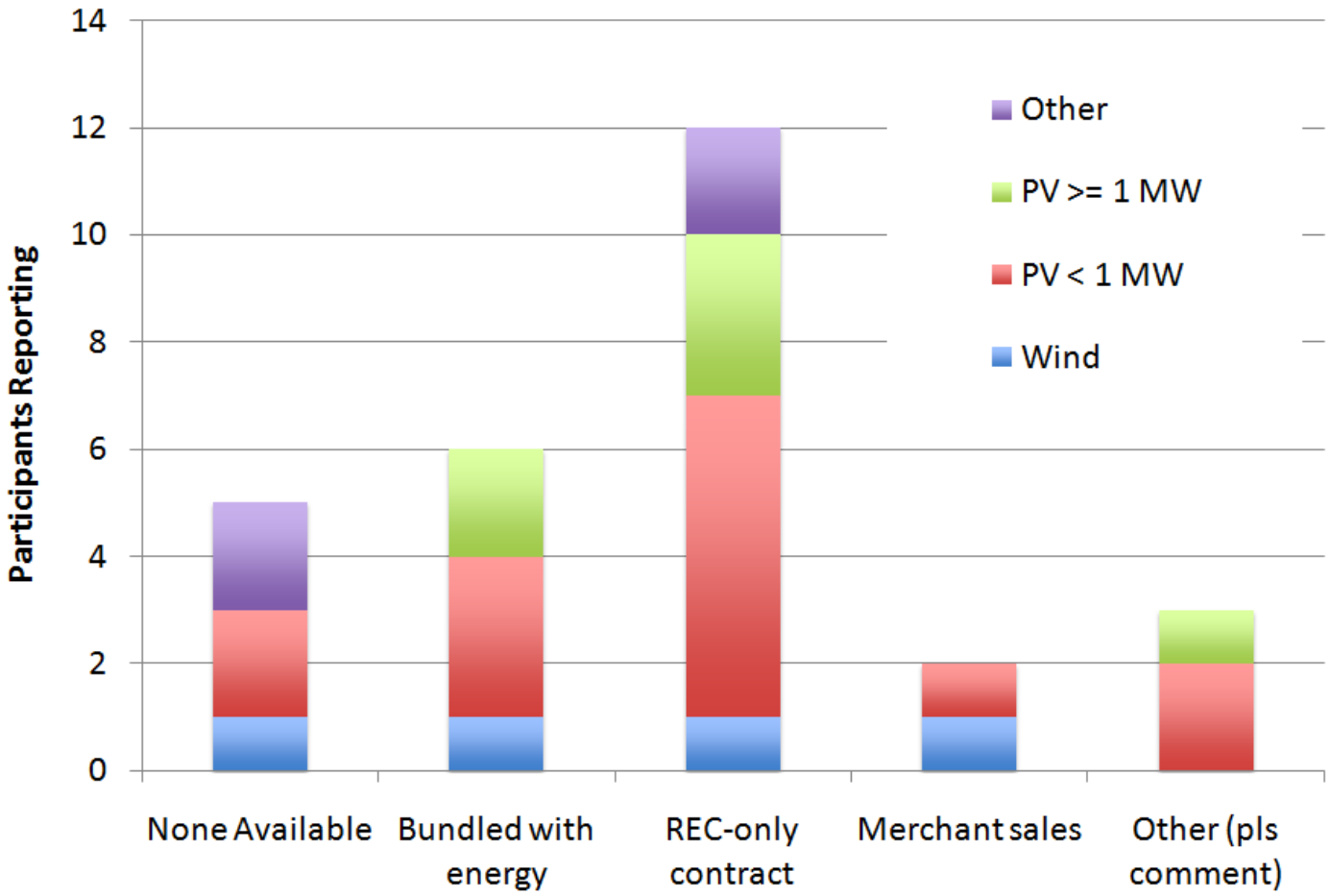
Form of REC Sales



High number of REC-only contracts reported among REFTI participants in Q3 '10. Prior quarters were dominated by bundled with energy

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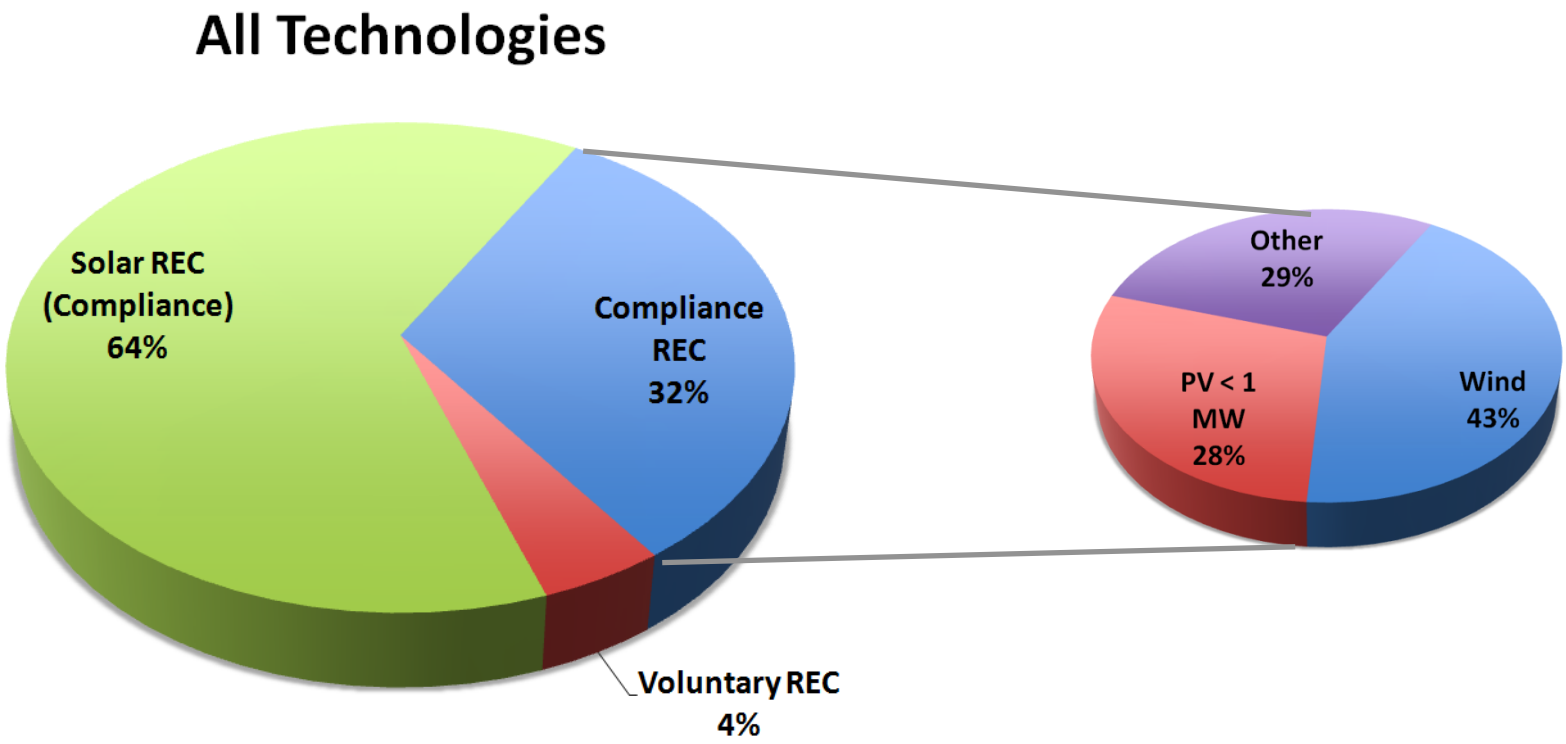
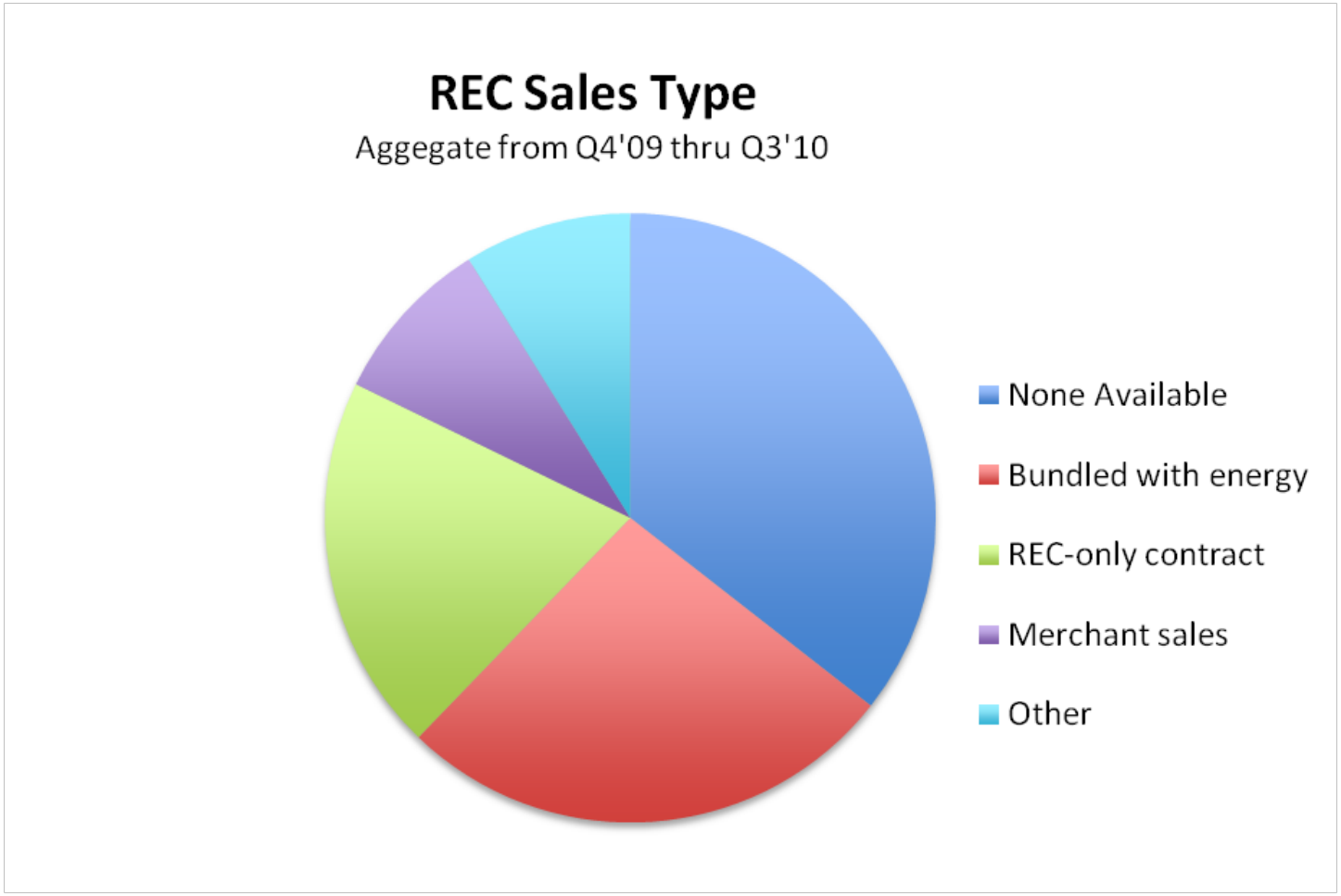
Breakdown of RECs Sold



Solar RECs were most relevant form of REC among REFTI participants

Form of REC Sales – Aggregate



Overall, REFTI participants most commonly indicated no RECs available; among those that had RECs bundled with energy and REC only contracts were relatively even

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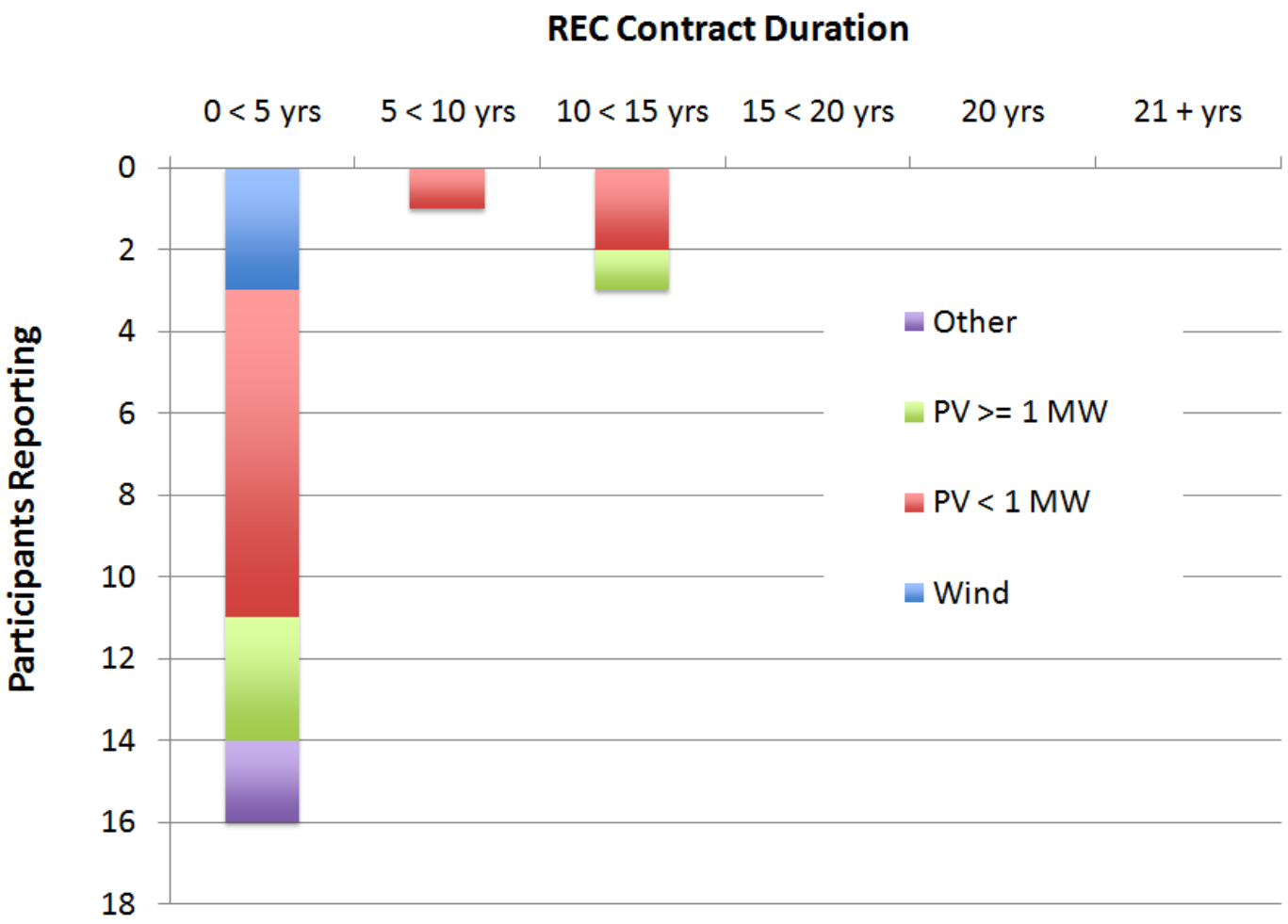
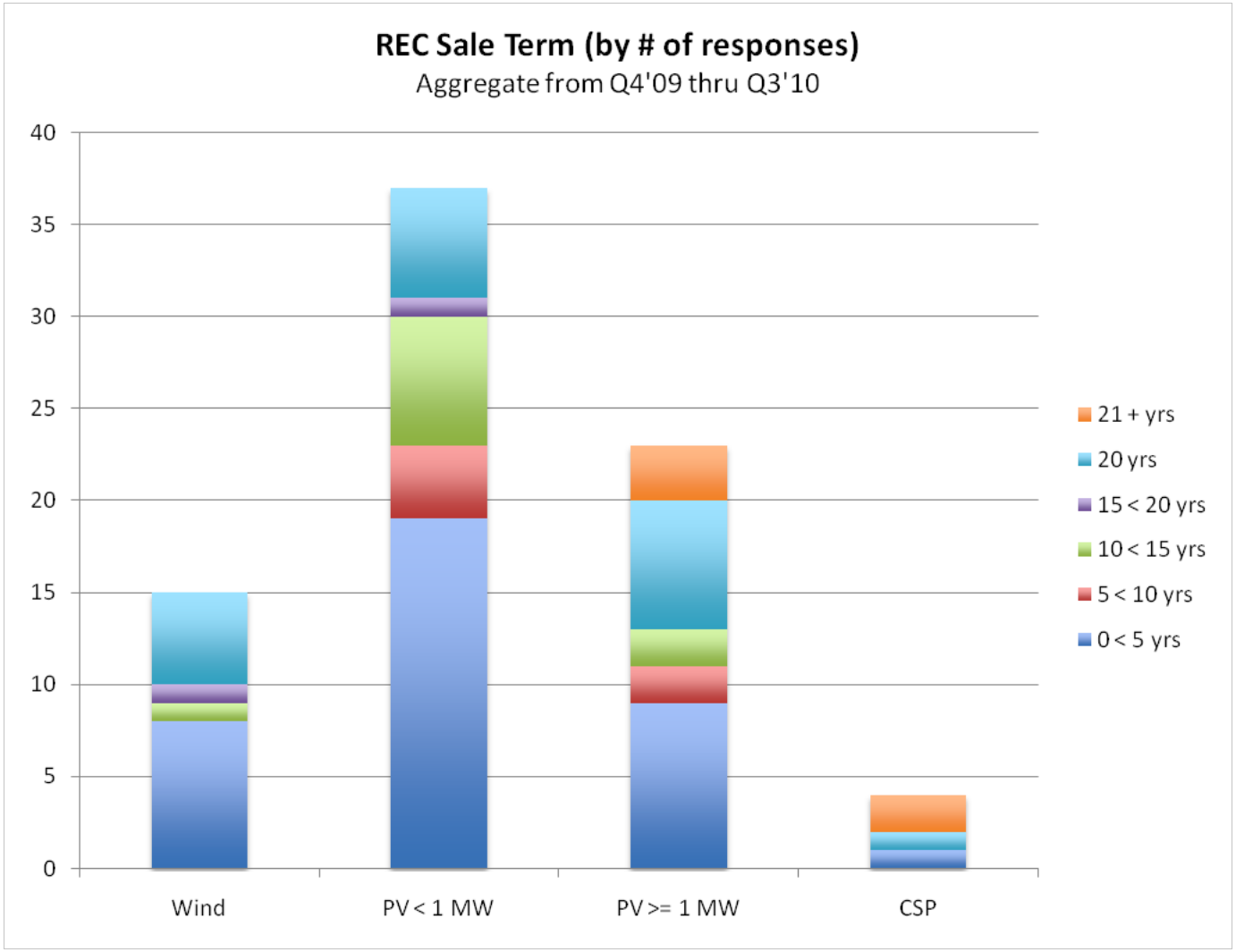
REC Contract Duration



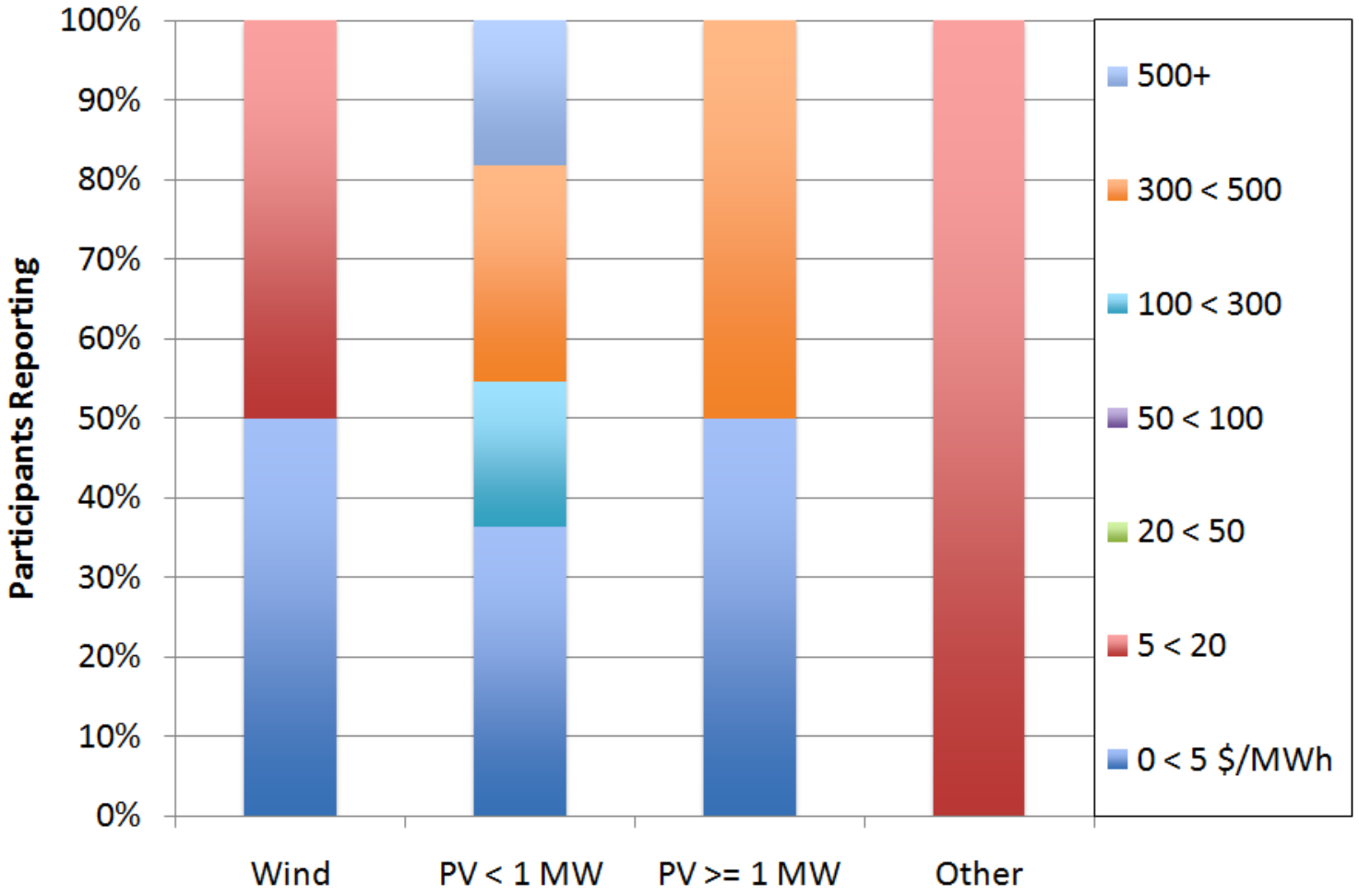
REC contracts generally very short-term (< 5 years)

REC Duration – Aggregate (Q4 '09 – Q3 '10)

REC duration most commonly < 5 years over prior 4 quarters



REC-Only Price ($/MWh)



Small PV REC prices range from < $5 /MWh to over $500/MWh

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REFTI Questionnaire: Q9

9. Please comment on the IMPORTANCE of different INCENTIVE PROGRAMS to developing your projects...

	Treasury Grants	State Incentives	Renewable Portfolio Standards (REC purchase)	Loan Guarantees
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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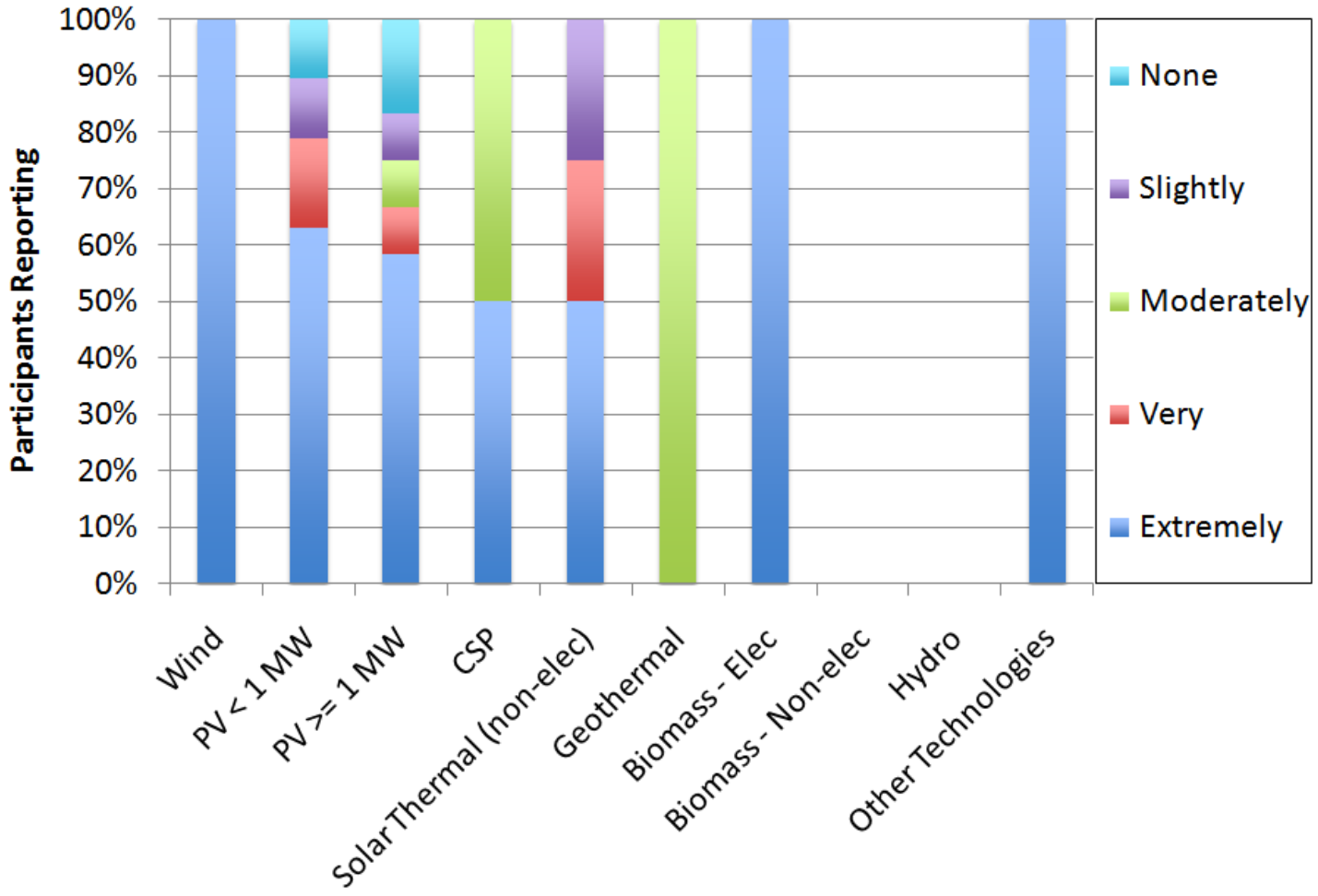
Importance of Treasury Grants



Scaled to 100%. Treasury Grants continue to be considered of extremely important, although noticeably less than prior quarters

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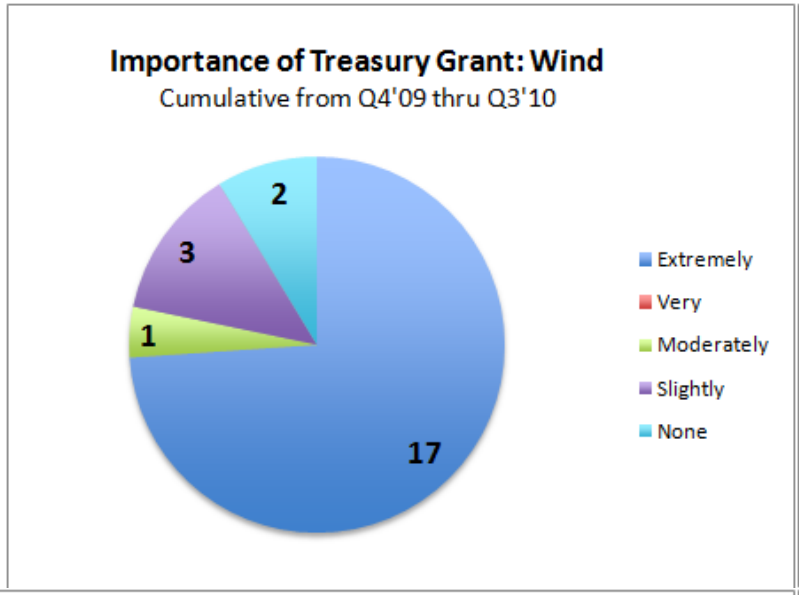
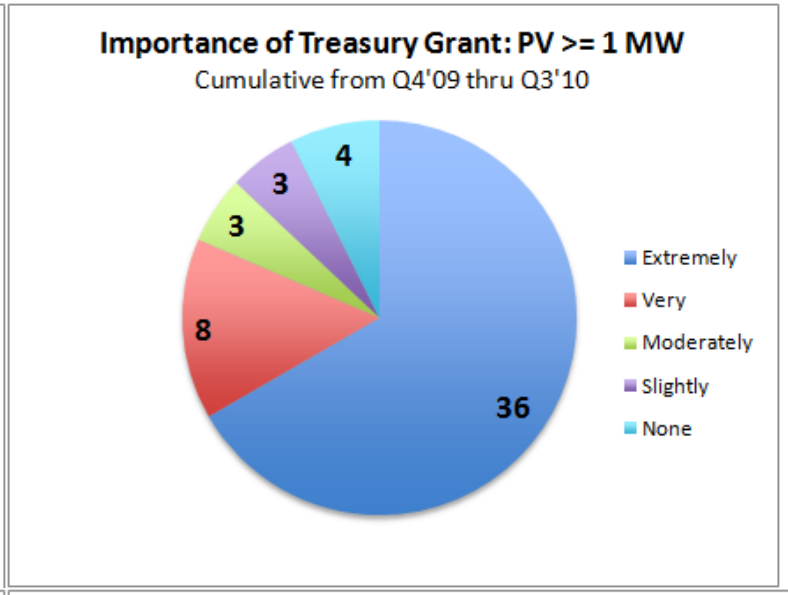
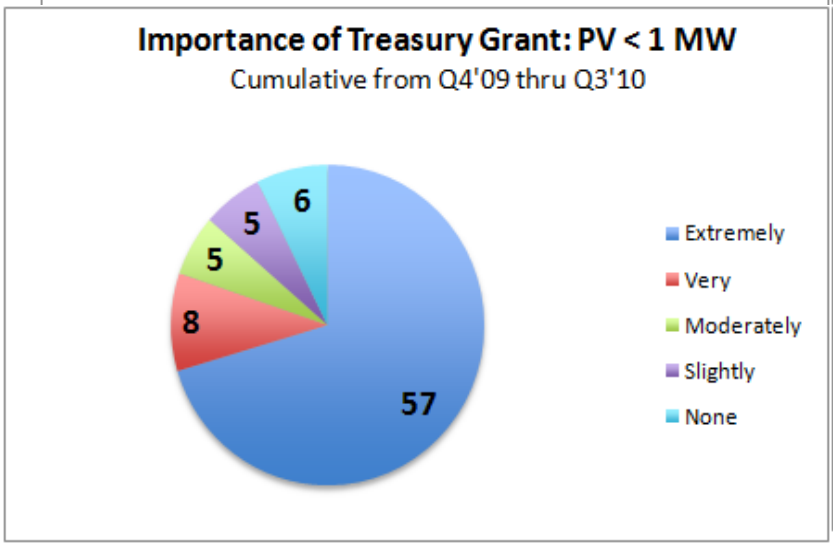
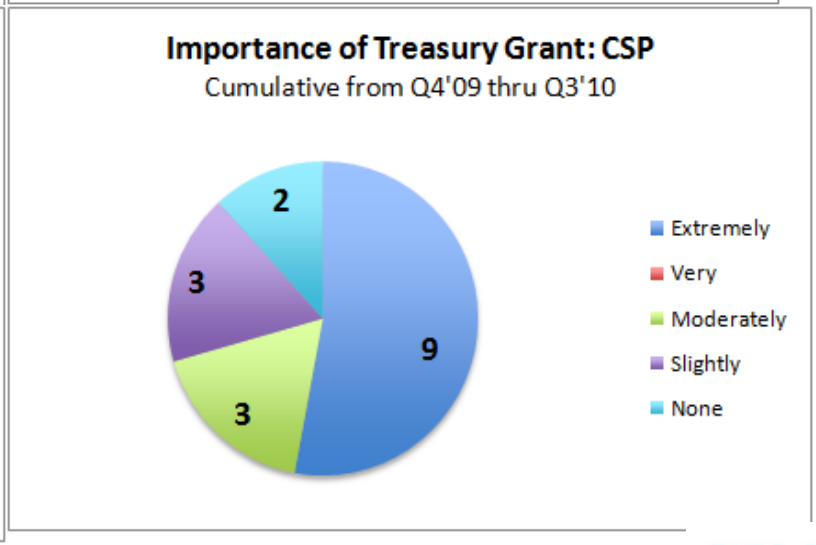
Treasury Grant Importance – Aggregate by Tech

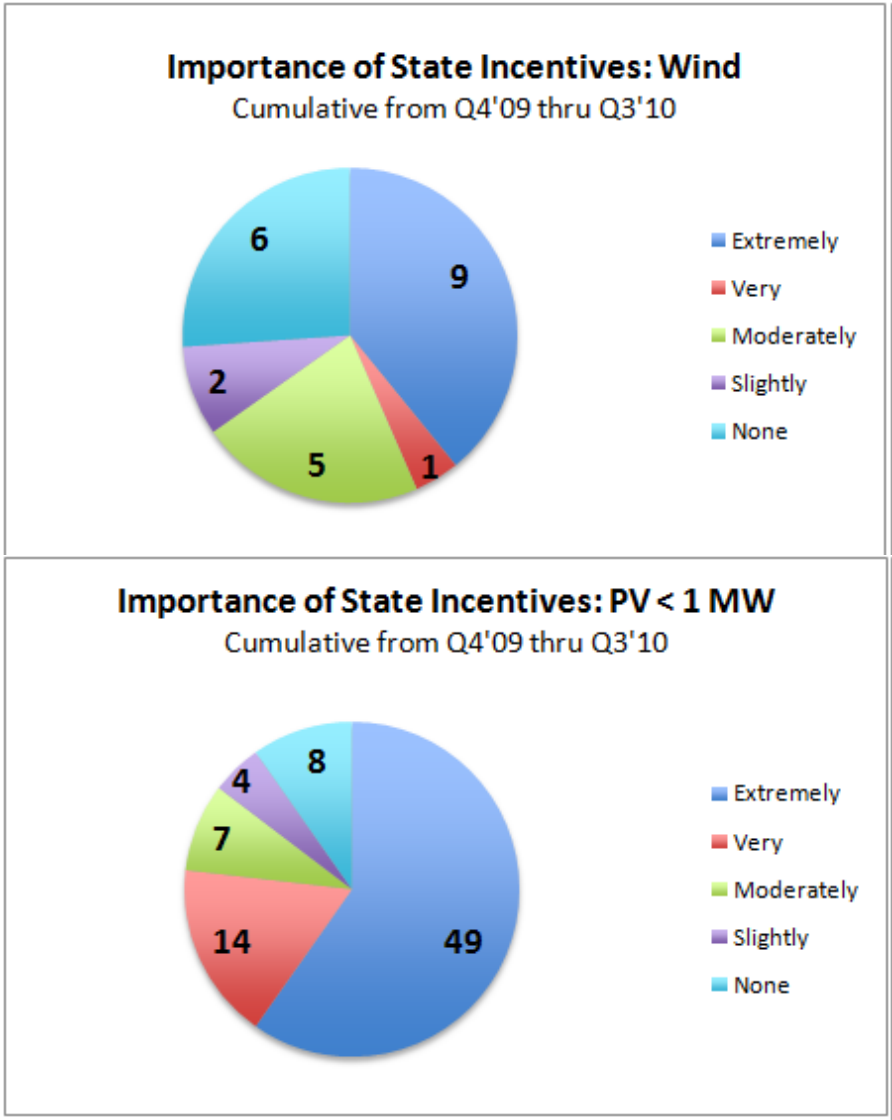


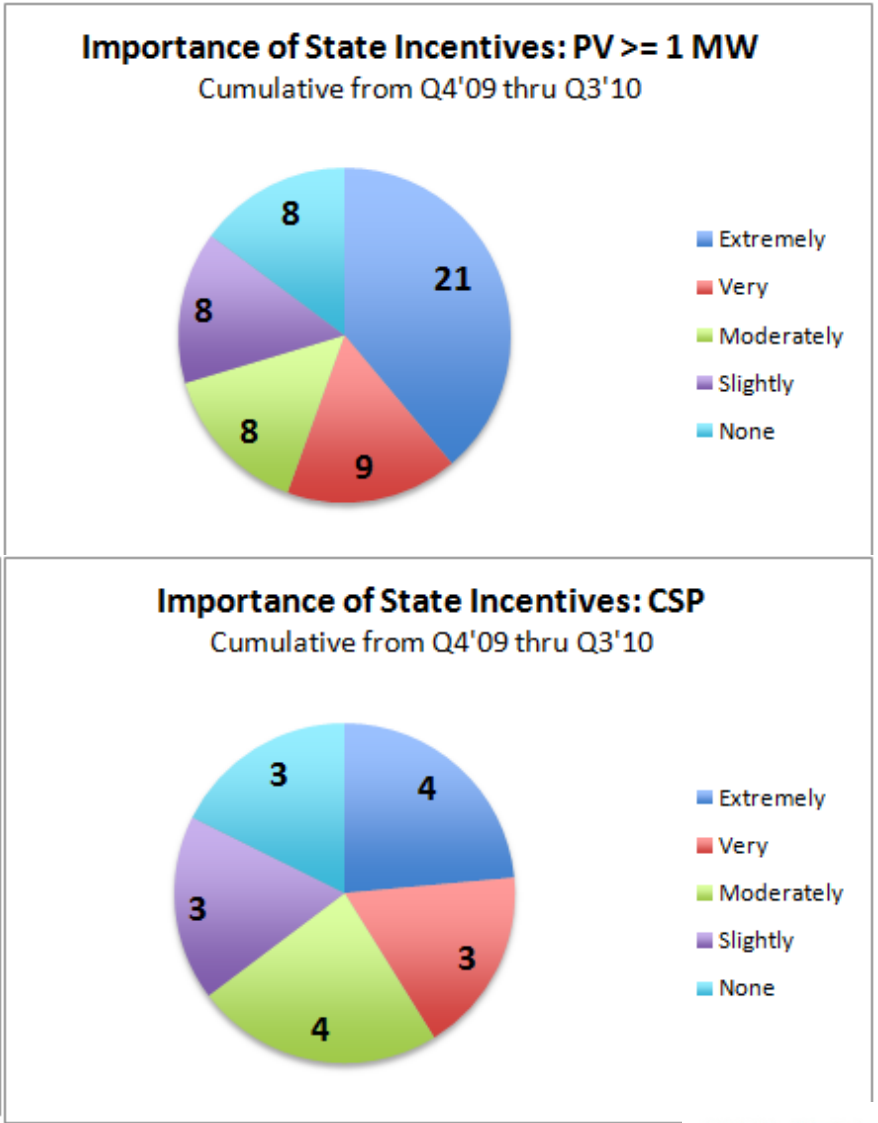




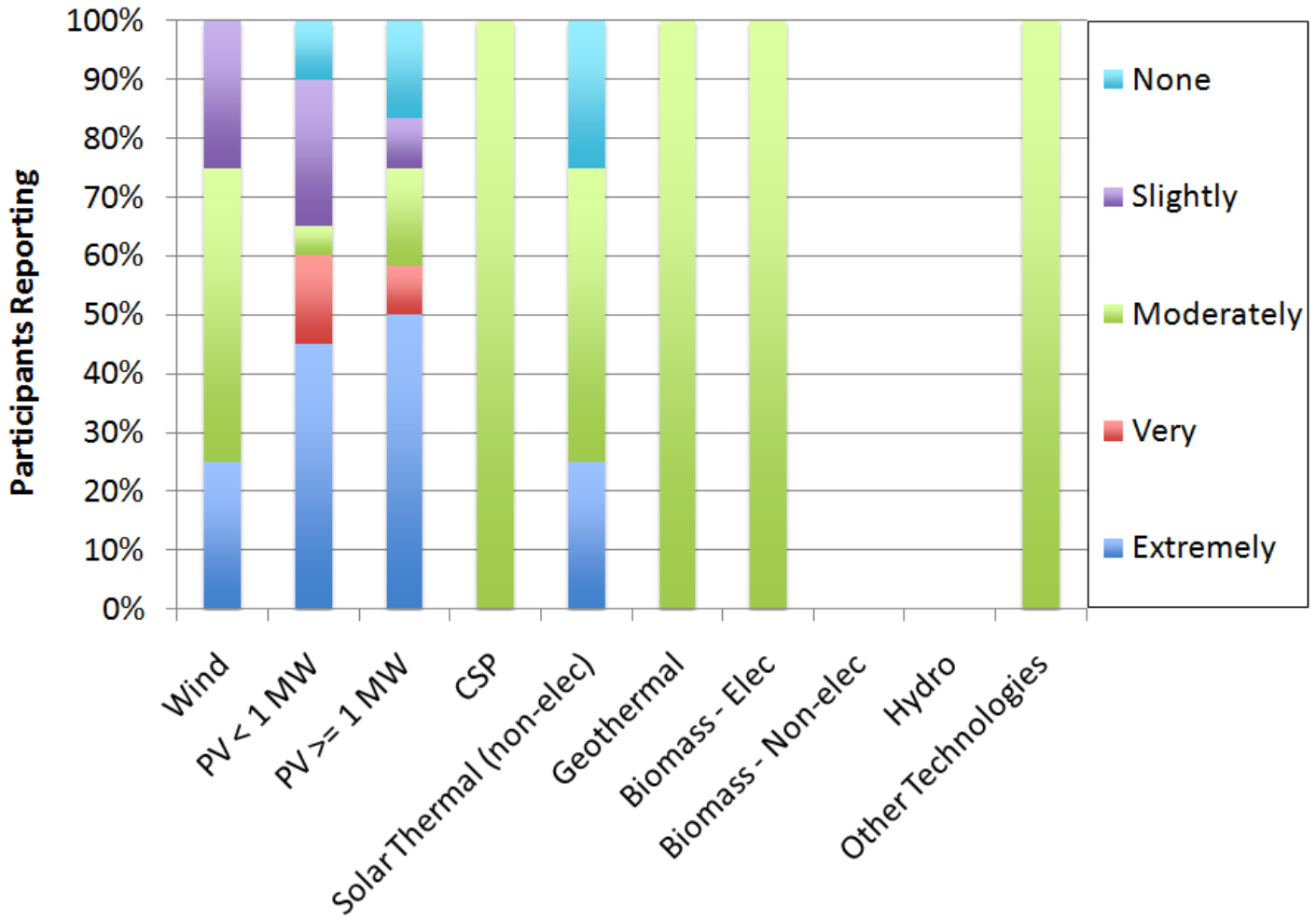


Importance of State Incentives – Aggregate by Tech





Importance of Portfolio Standards



Scaled to 100%. Portfolio standards only considered moderately important across most technologies among Q3 participants

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REFTI Questionnaire: Q10

10. Please provide the following parameters to the typical Power Purchase Agreement (PPA) used in prior quarter...

	PPA Term (yrs)	Yr. 1 PPA Price (¢/kWh)	PPA Price Escalation (%)	Customer Buyout Option (yrs)
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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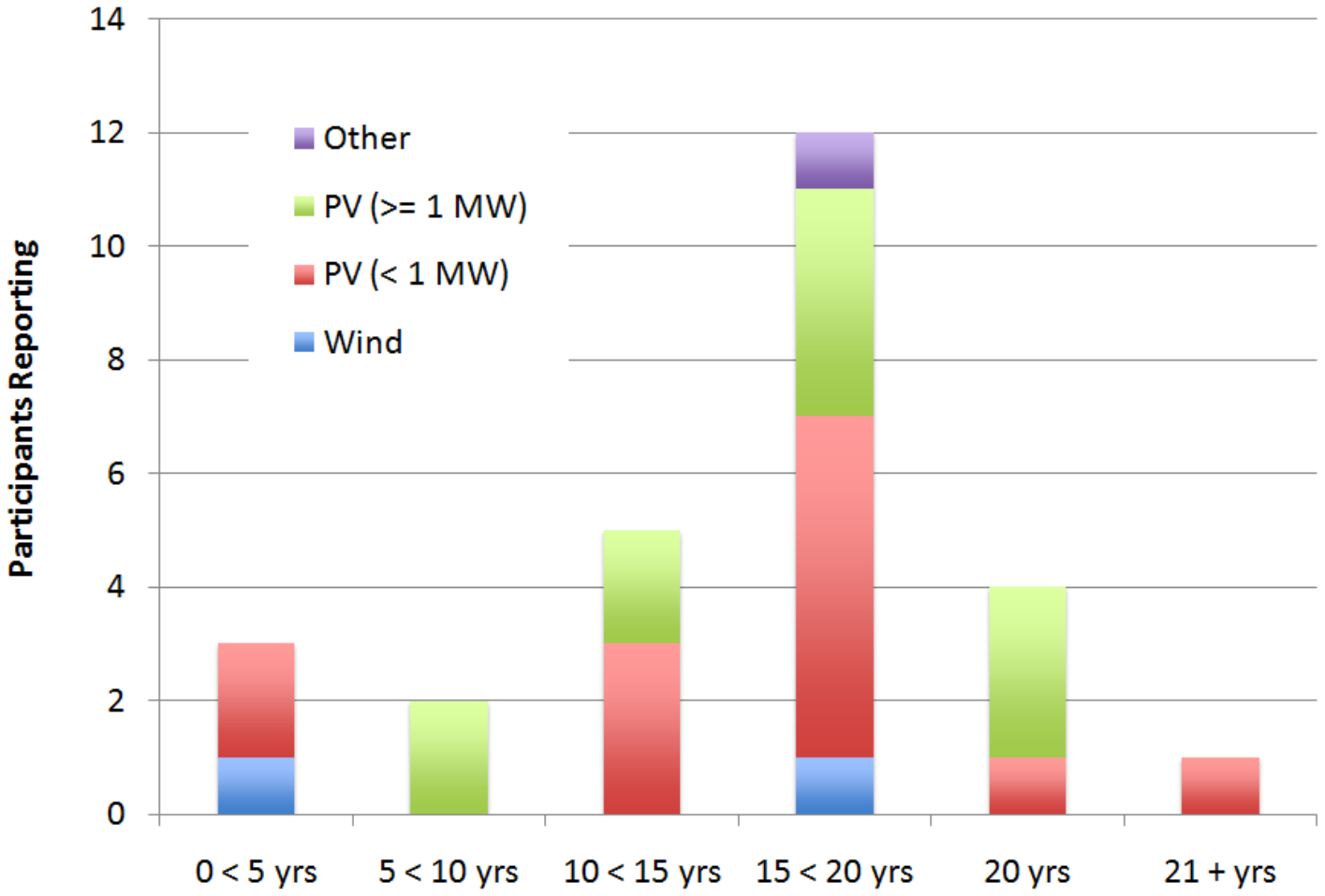
Typical PPA Duration



Most typically in 15-20 year range, shorter than expected

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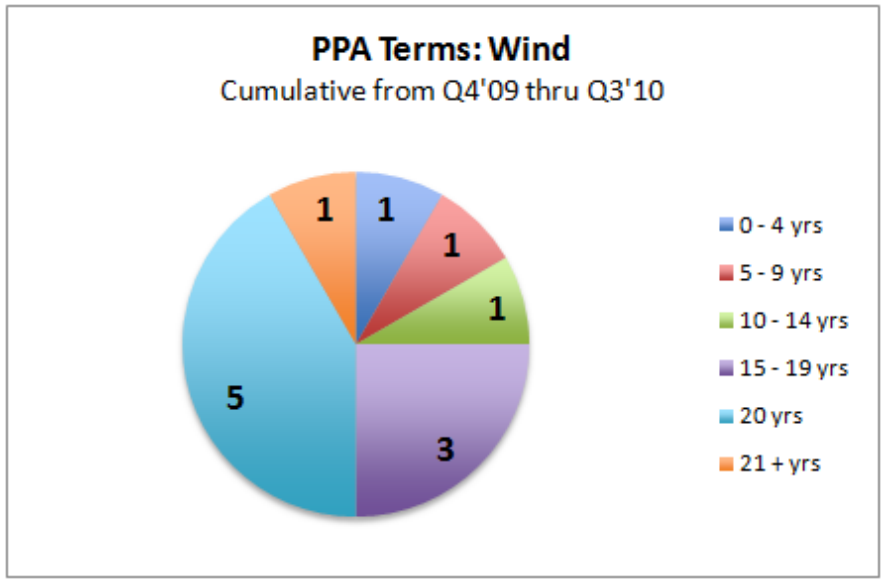
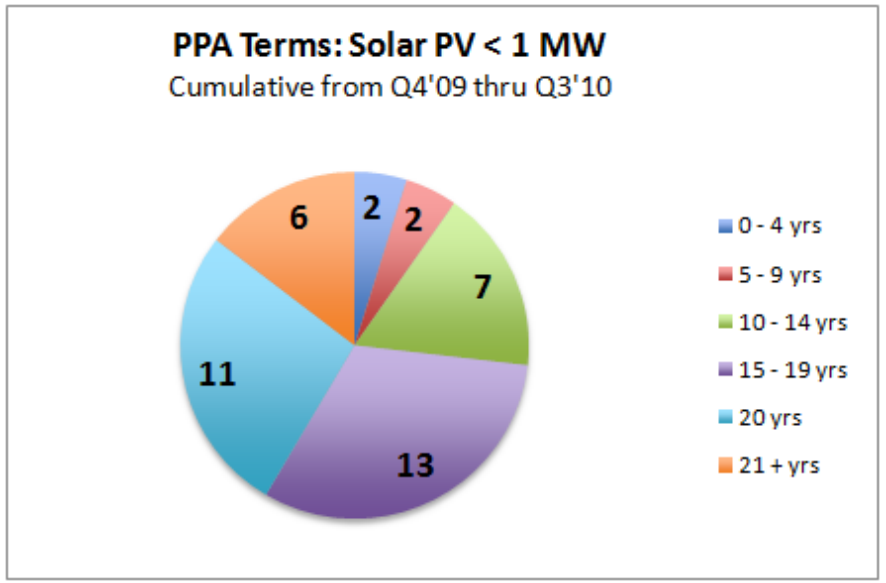
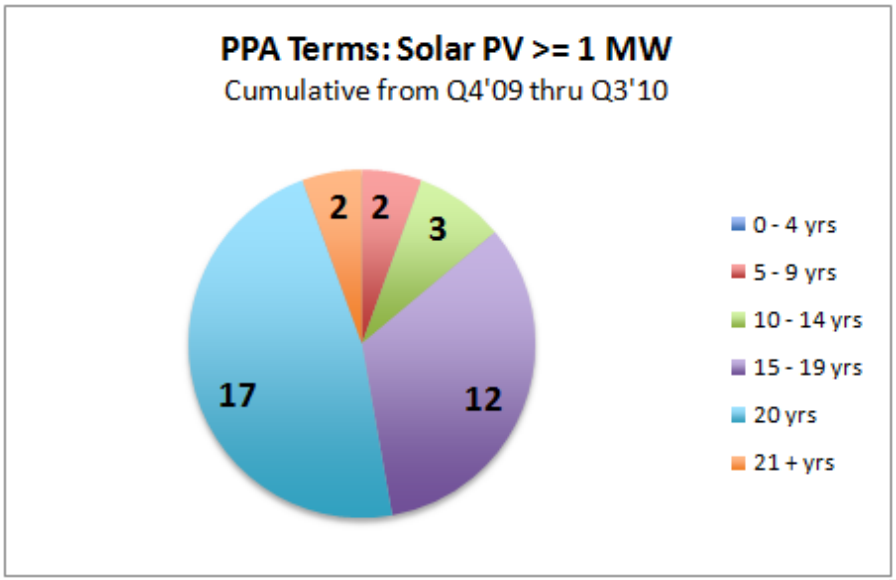
Typical PPA Duration – Aggregate Tech Breakout





Wind and large PV most commonly with 20 year PPAs, small PV more common to see 15-19 year PPAs



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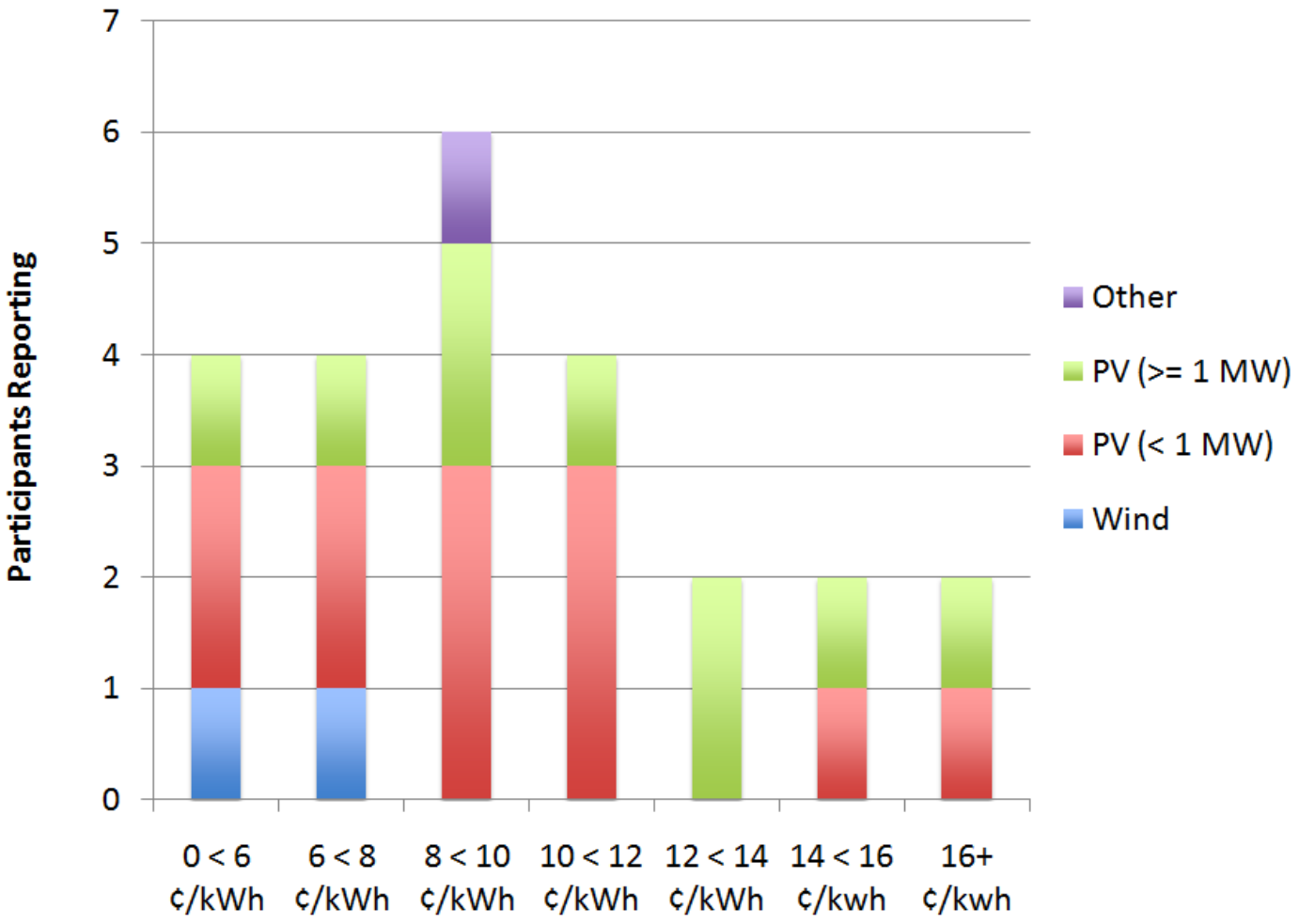
PPA Price - Year 1



PPA prices likely highly dependent on resource, state-specific incentives, and prevailing utility rates

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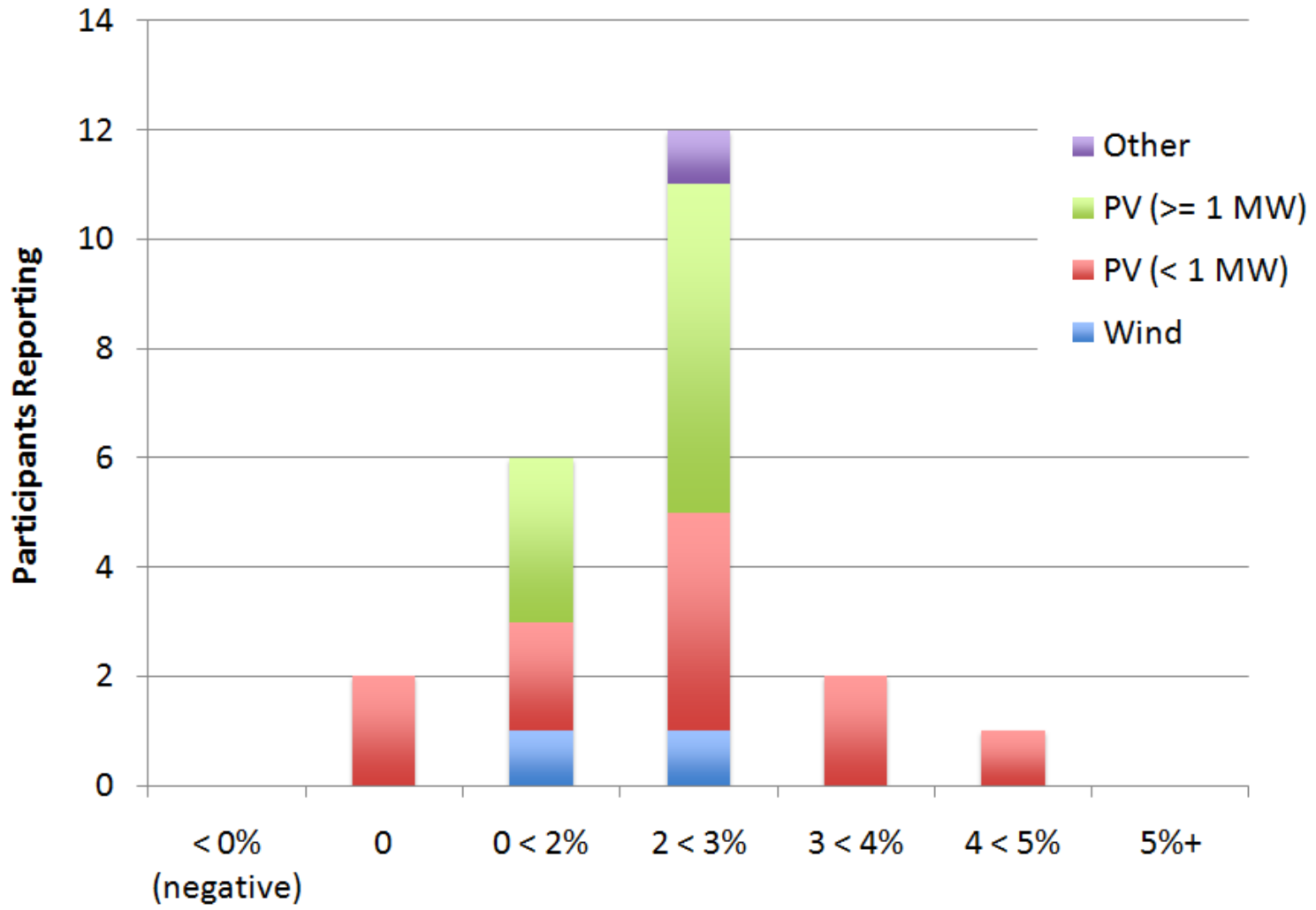
PPA Price Escalation



Most PPA contracts escalate at some rate, usually in 2-3% range

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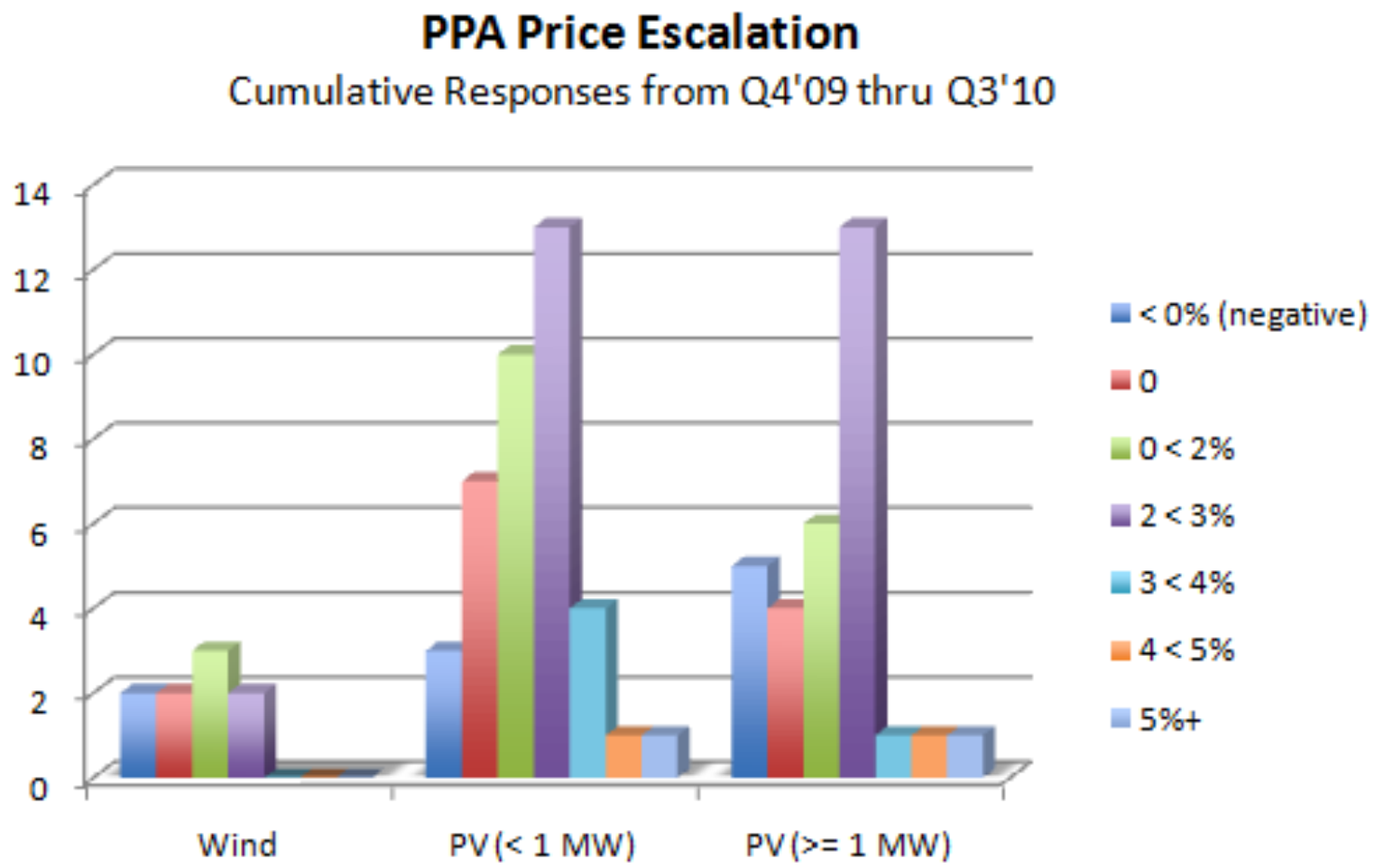
PPA Price Escalation - Aggregate



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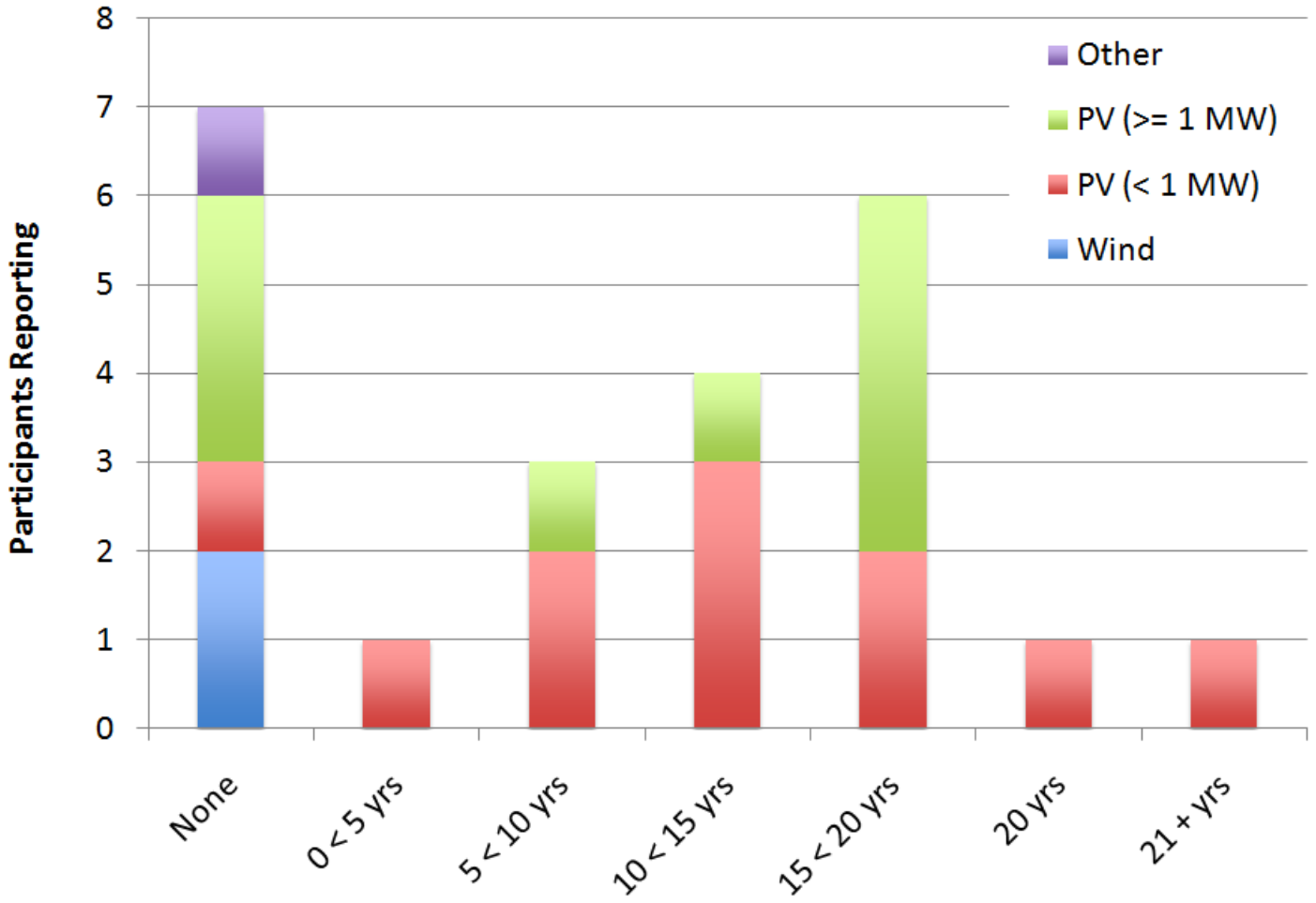
PPA Customer Buyout Option



Large number of respondents indicate no customer buyout is available, remainder say buyout most commonly at 15-19 yr range

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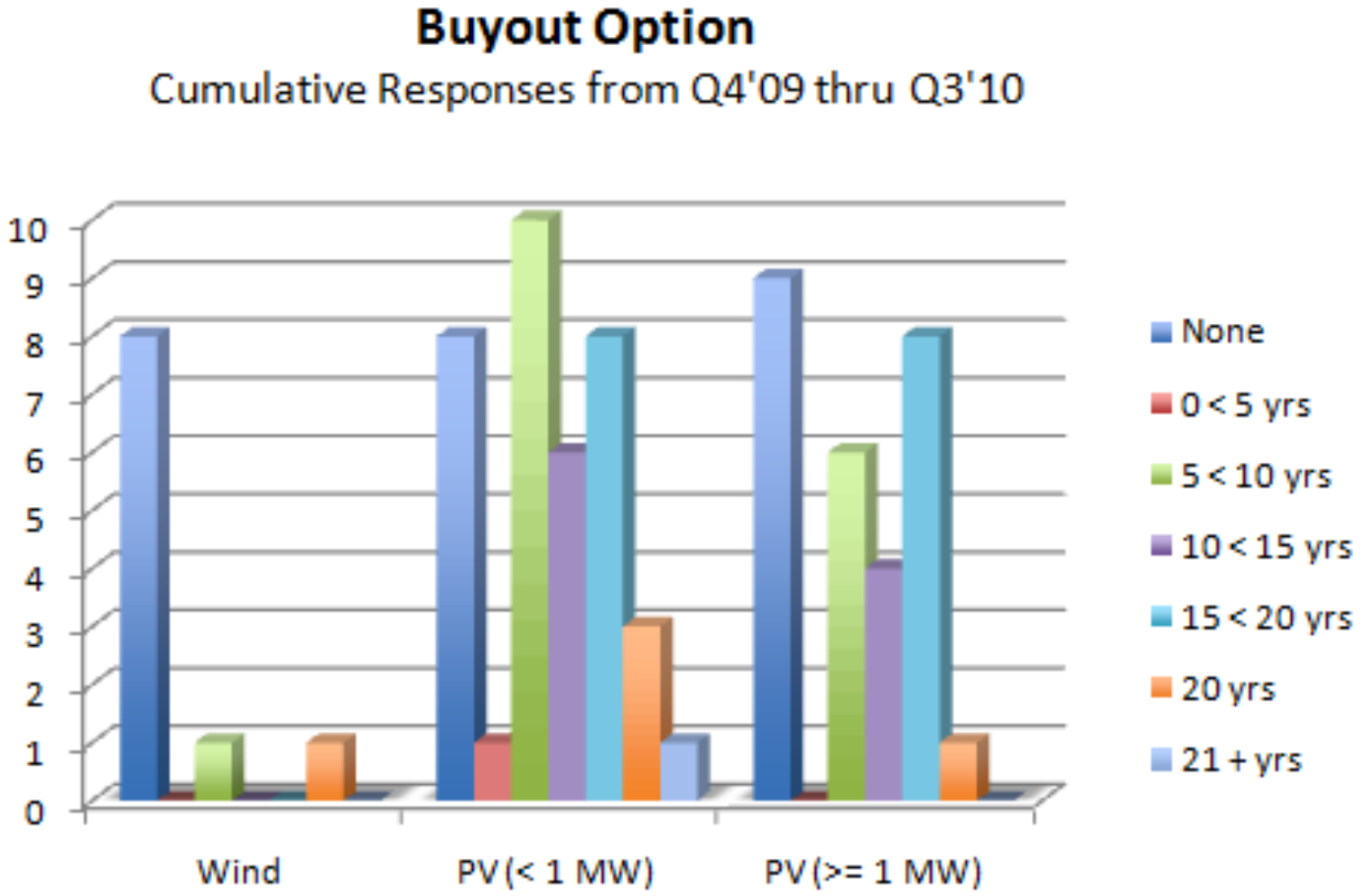
PPA Customer Buyout Option - Aggregate



Across past 4 quarters, wind projects largely had no buyout option; small PV most commonly in the 5-10 year range.

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REFTI Questionnaire: Q11

11. Regarding project EQUITY CAPITAL (based on after-tax returns), please tell us how your projects are generally structured...

	Ratio of Tax-Investor Equity / Total Capital	Expected Return on Tax-Investor Equity	Ratio of Developer Equity / Total Capital	Expected Return on Developer Equity
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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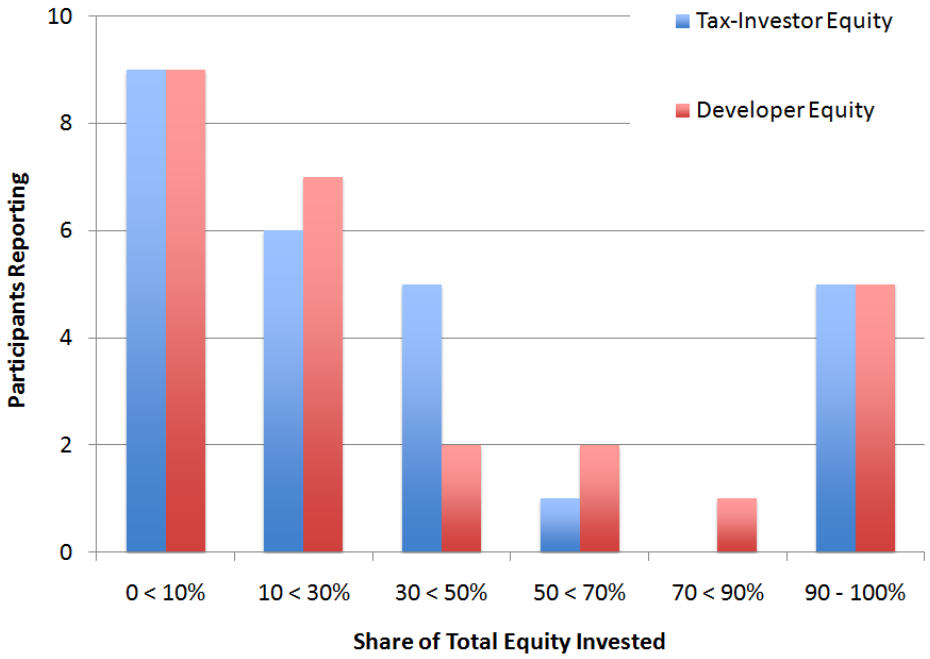
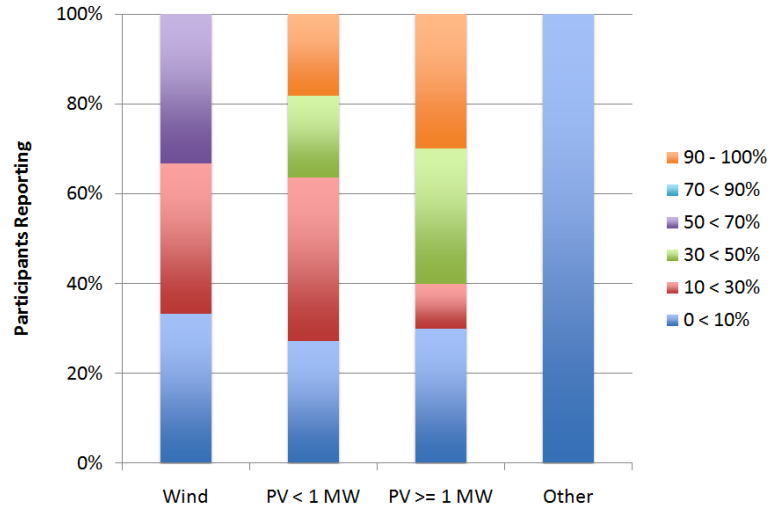
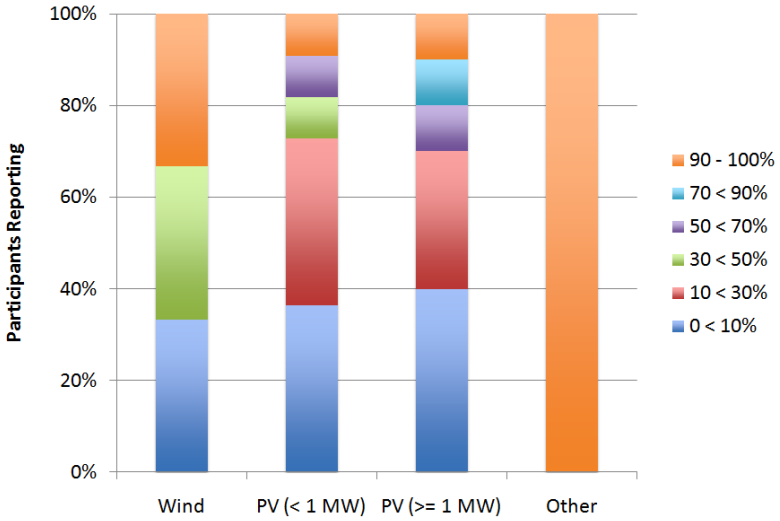
Equity Ratios – Q3 '10



Tax and Developer equity primarily each less than 50% of total capital invested

Tax Equity





Dev. Equity

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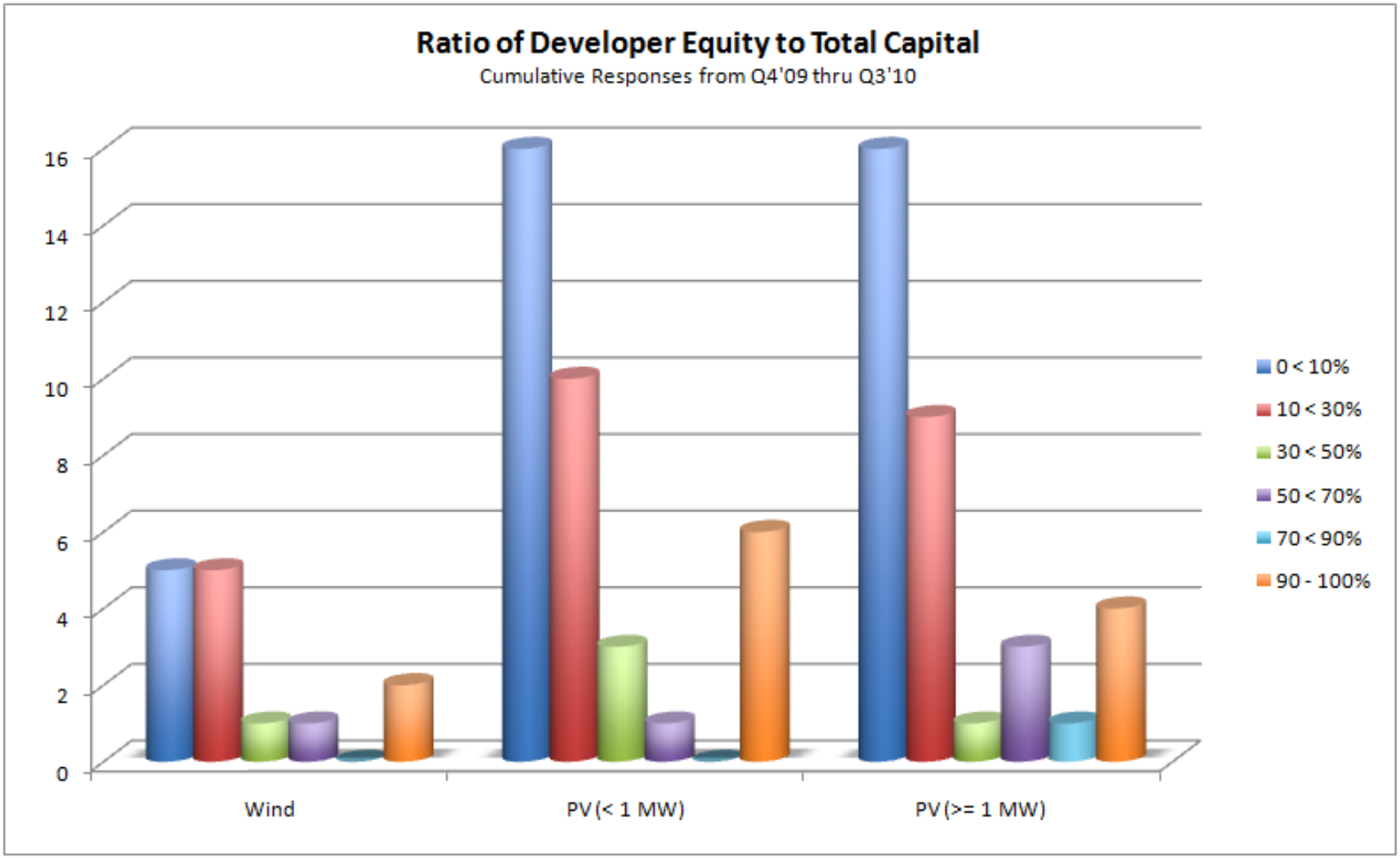
Developer Eq. to Total Capital - Aggregate



Over prior 4 quarters, developer equity primarily represented 0-10% of project capital, particularly for PV

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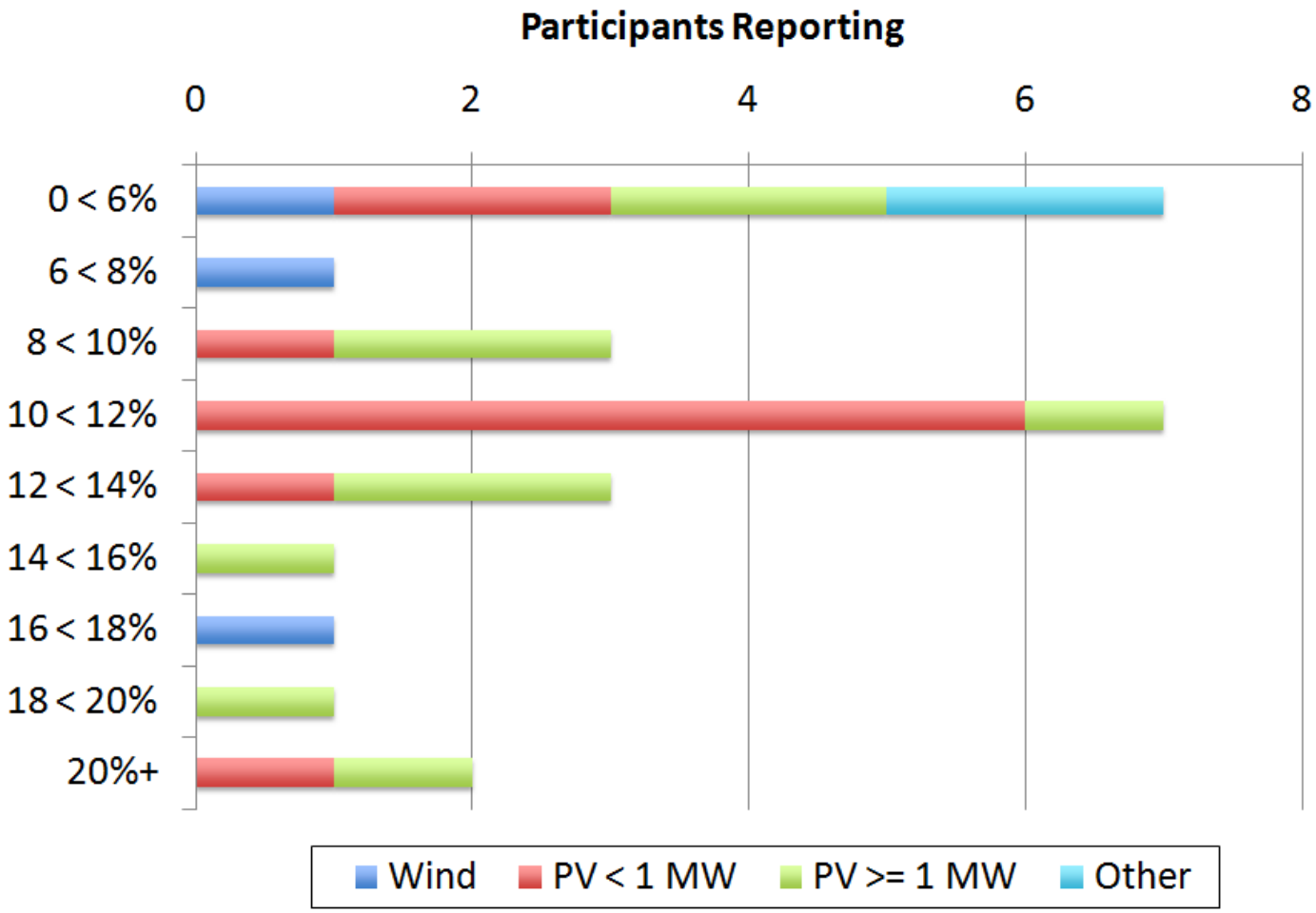
Expected Return on Tax-Investor Equity



Tight bandwidth for wind projects. Much wider for small and large PV

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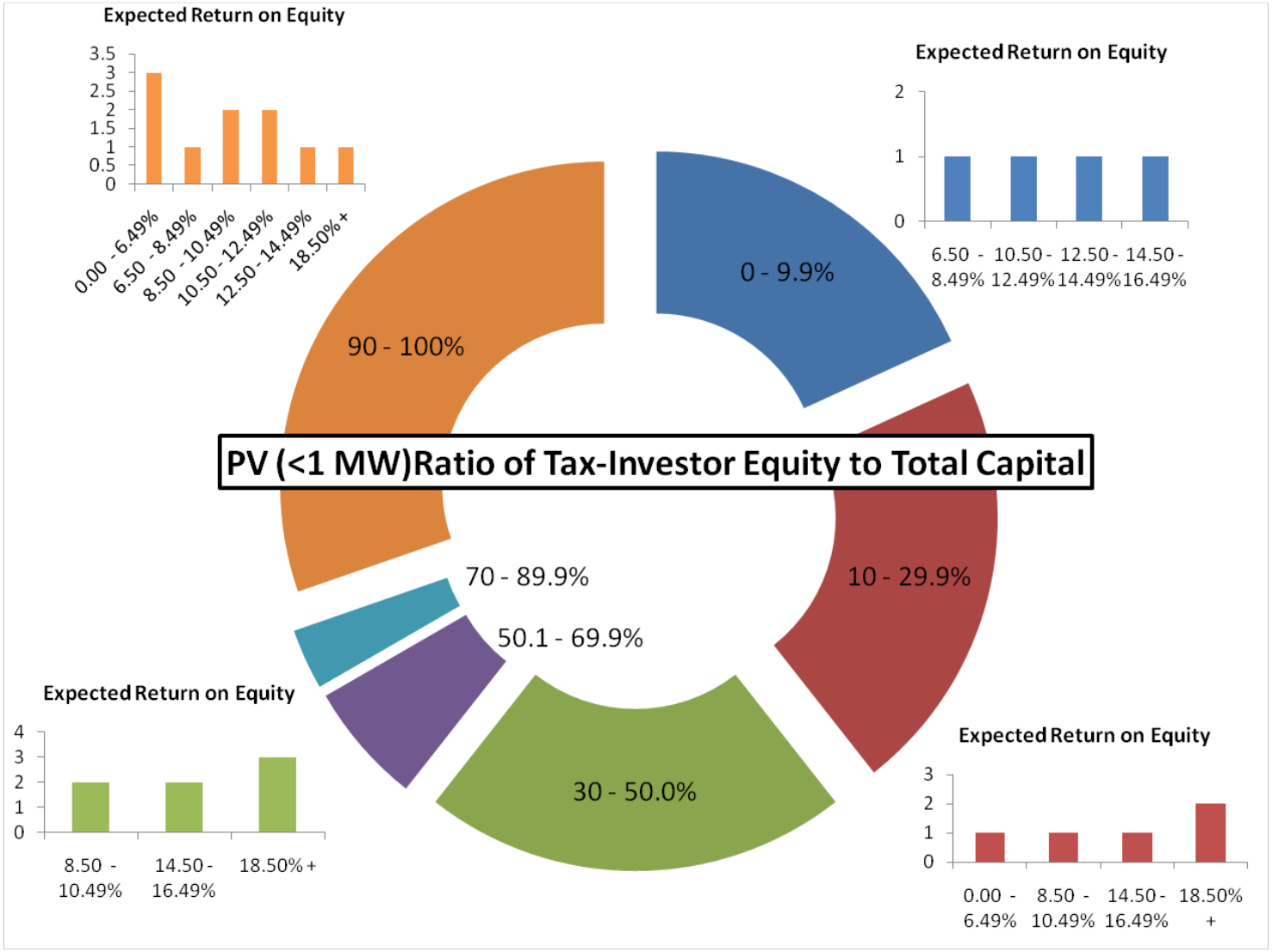
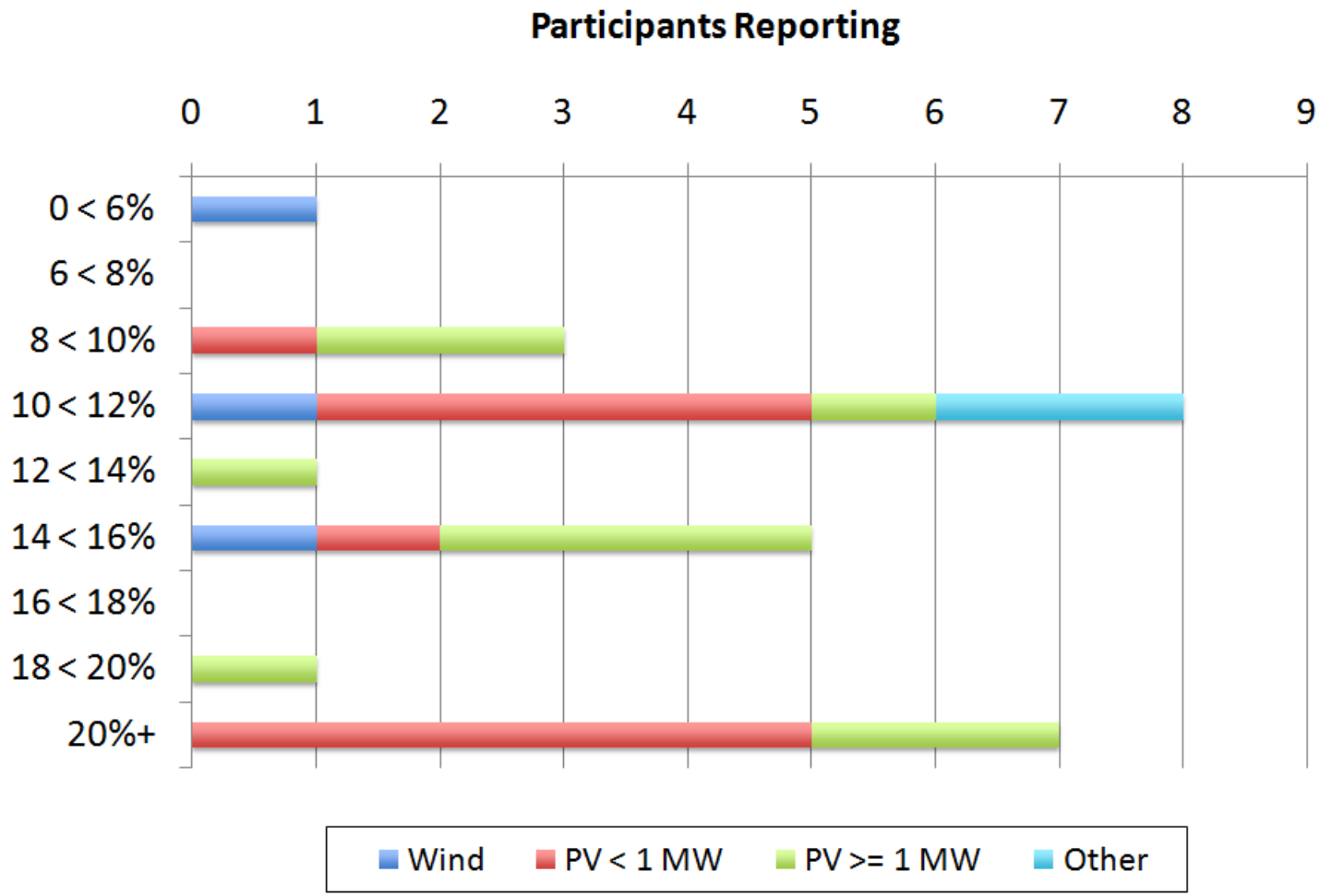
TE Ratios & Ass. Expected ROE: PV < 1 MW

Expected tax equity returns appear to be lower if TE represents a larger portion of total capital



Expected Return on Developer Equity



Developer returns most commonly in the 10-12% range, but also above 20%

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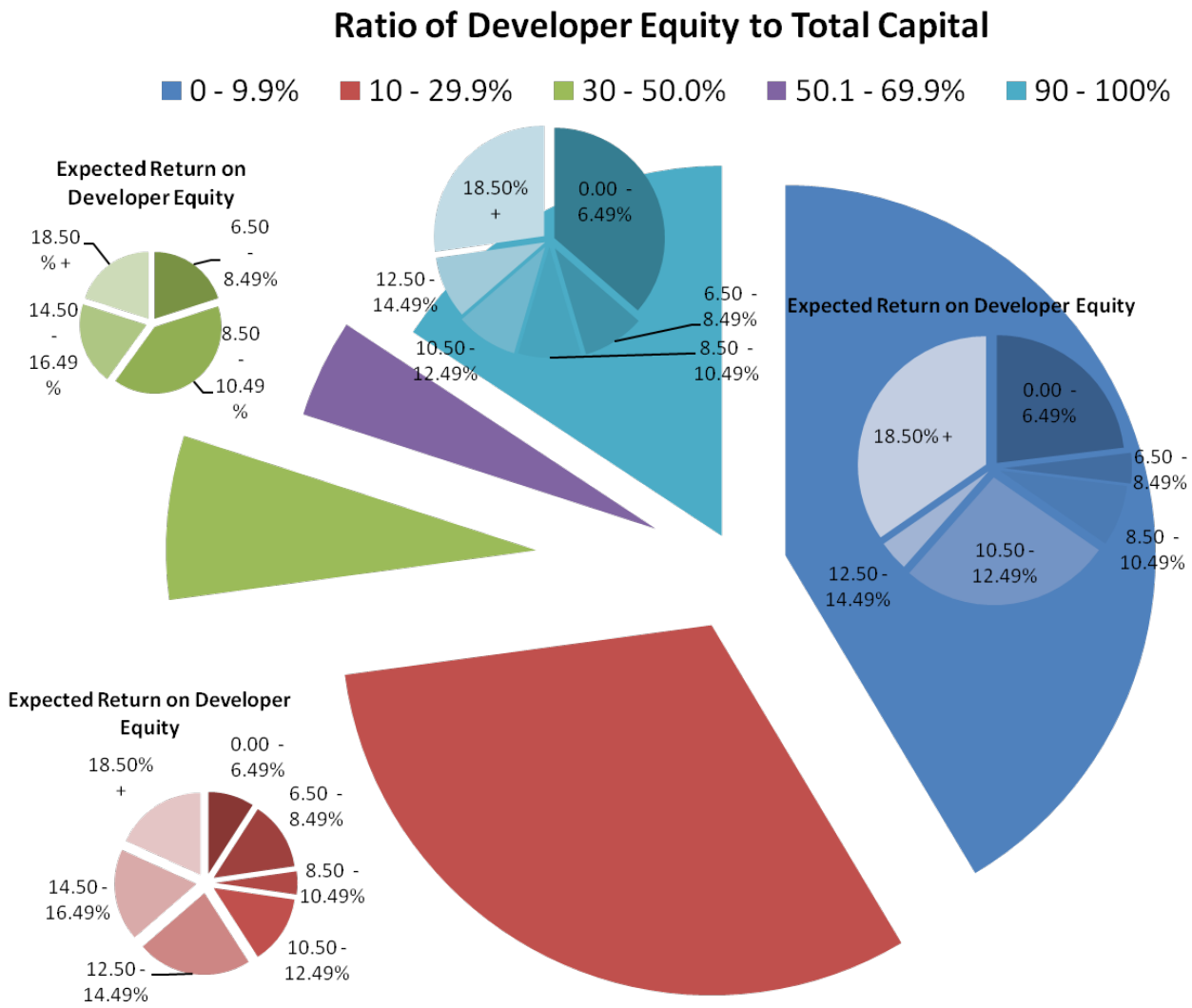
Ratio of Developer Equity & ROE



Expected return on developer equity based on the ratio of investment to total capital

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REFTI Questionnaire: Q12

12. Regarding project-level CONSTRUCTION debt, please tell us how your projects are generally structured...

	Nature of Const. Debt	Ratio of Const. Debt / Total Capital	Average All-In Cost of Const. Debt (%)	Const. Debt Term (months)
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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REFTI Questionnaire: Q13

13. Regarding project-level TERM debt, please tell us how your projects are generally structured...

	Source of Debt	Ratio of Debt / Total Capital	Ratio of Fed Loan Guarantee / Debt	Avg. All-In Cost of Debt (%)	Debt Term (yrs)	Avg. Debt Coverage Ratio Required
Wind						
Solar - PV (< 1 MW)						
Solar - PV (>= 1 MW)						
Solar - CSP						
Solar Thermal (non -elec)						
Geothermal						
Biomass - Elec						
Biomass - Non-elec						
Hydro						
Other Technologies						

Comments

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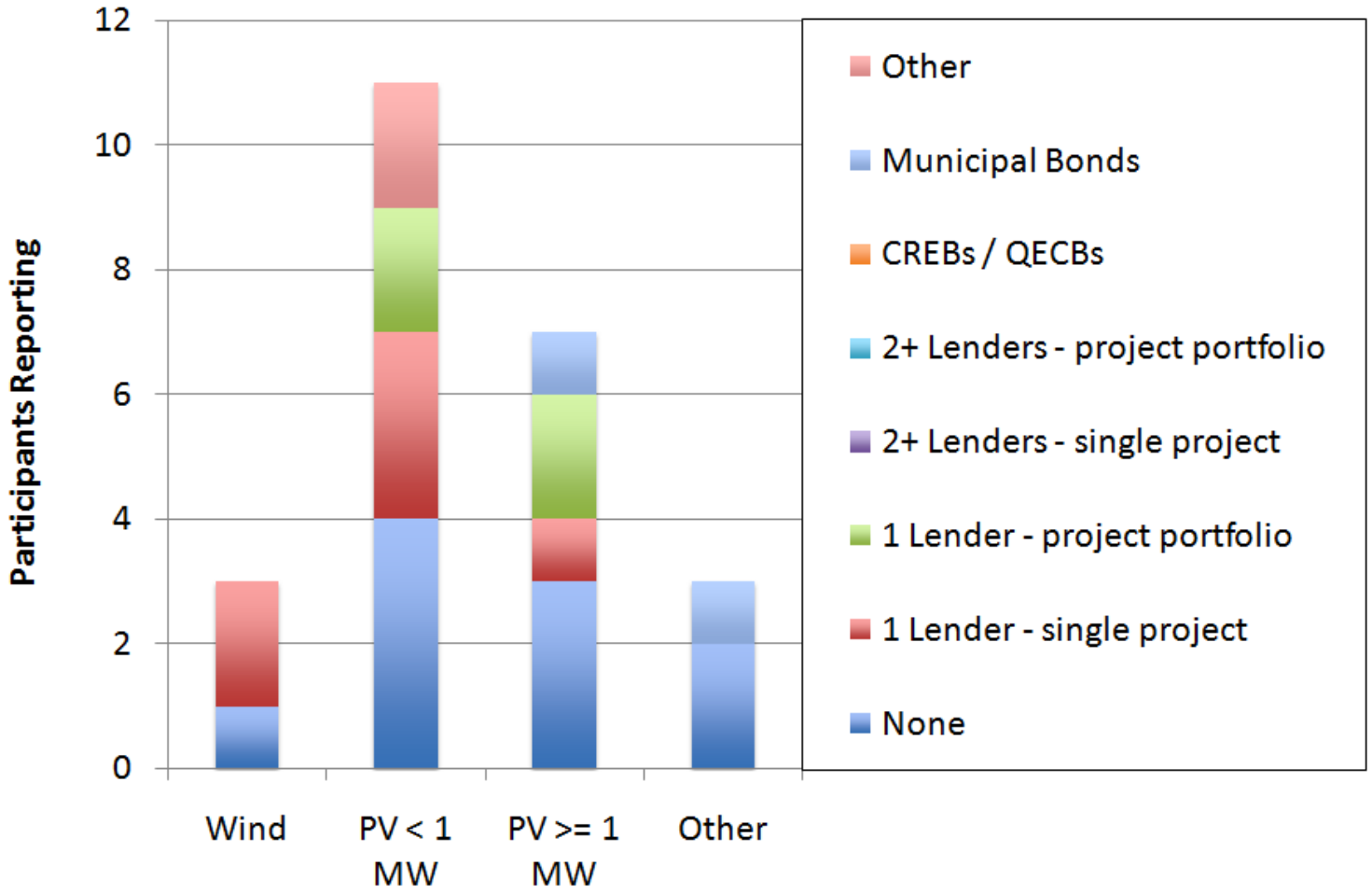
Source of Term Debt



REFTI redesigned to specify multi-bank “club” deal in Q3 ‘10. No participants referenced this though

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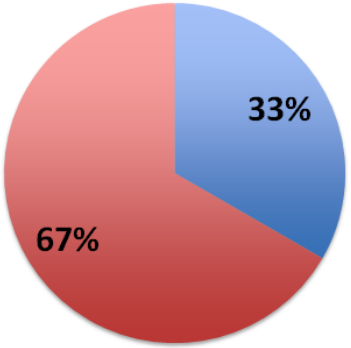
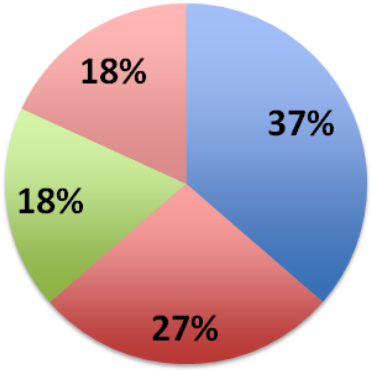
Source of Term Debt

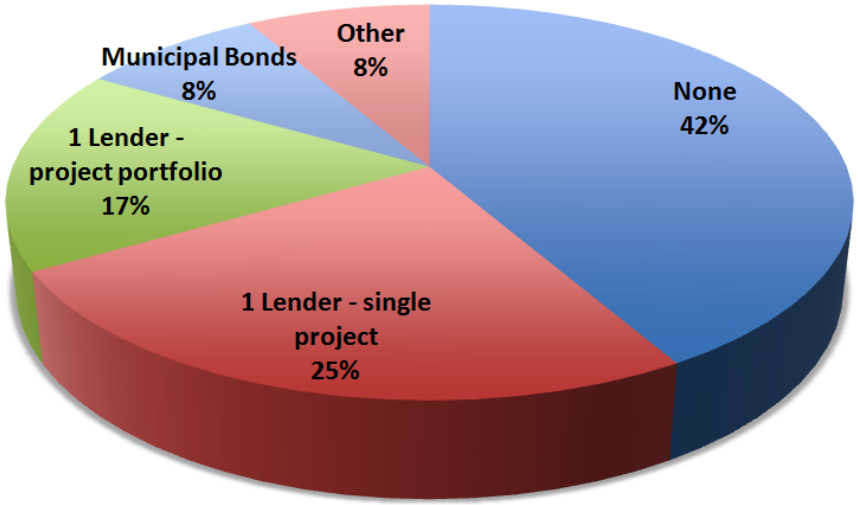
Wind



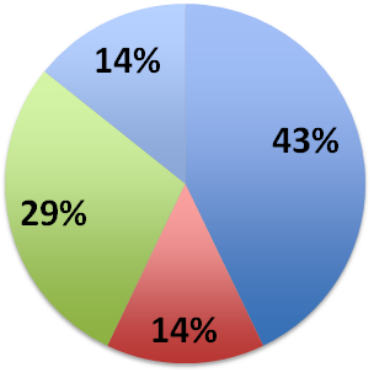
PV (<1MW)



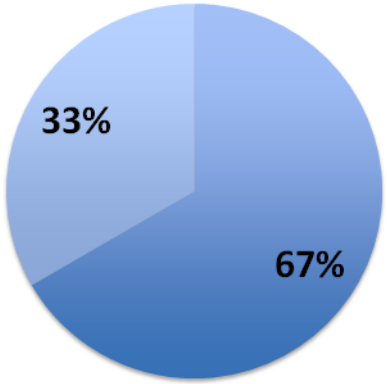
All Technologies



PV (>1MW)



Other



Most commonly, REFTI projects had no debt. Projects with debt most commonly had single lender, single project form of debt

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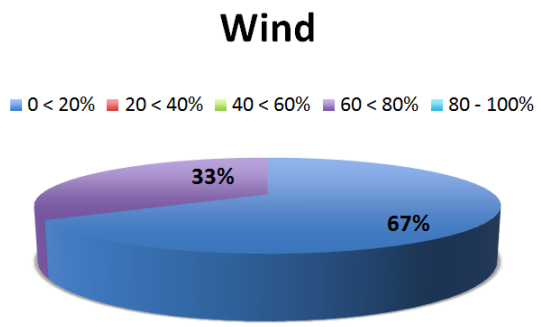
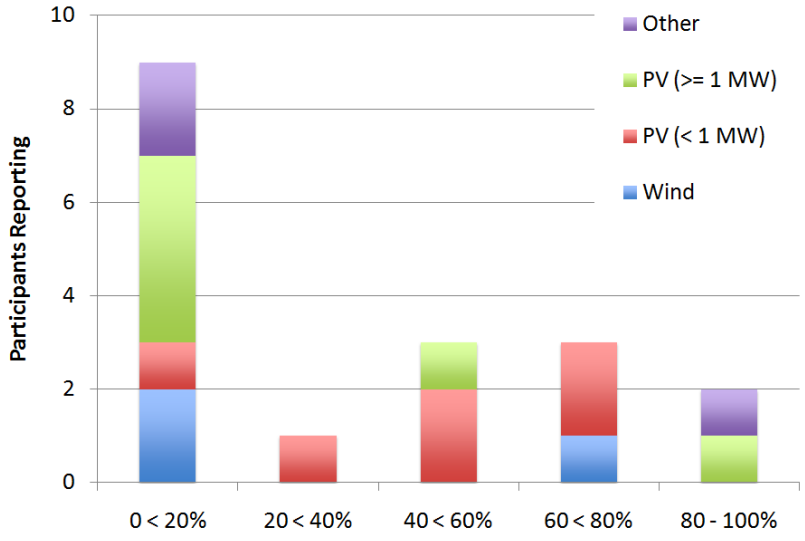
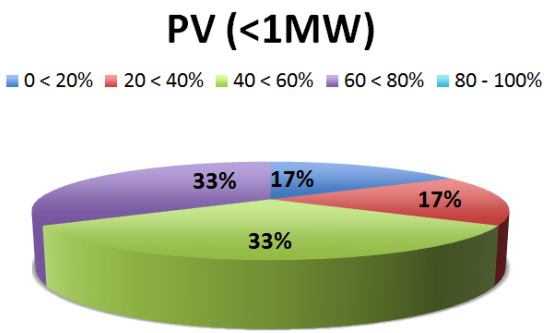
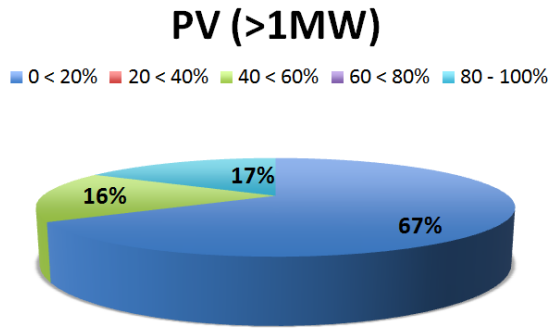
Term Debt as % of Total CapEx

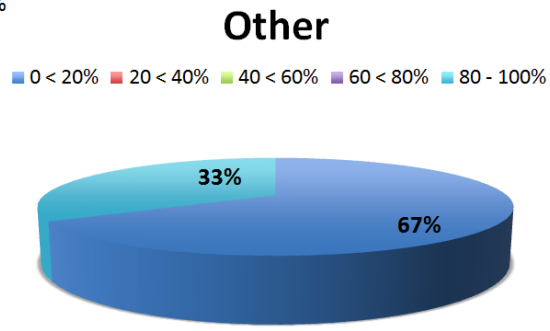




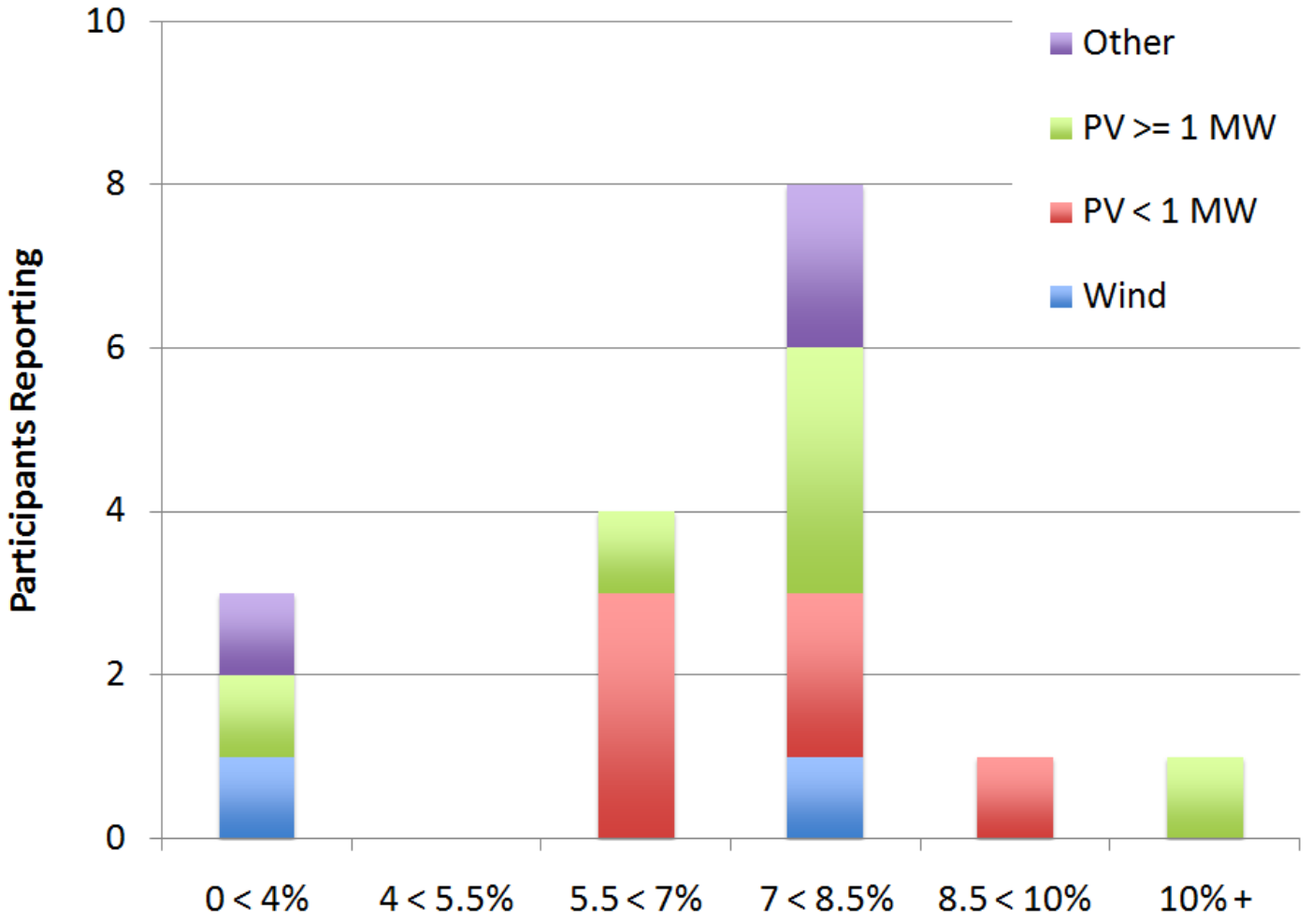




If projects had debt, it was most commonly for a minority fraction of total capital needed



Cost of Term Debt (all-in)



Most commonly in the 7.0% – 8.5% range in Q3, but participants reporting very wide range

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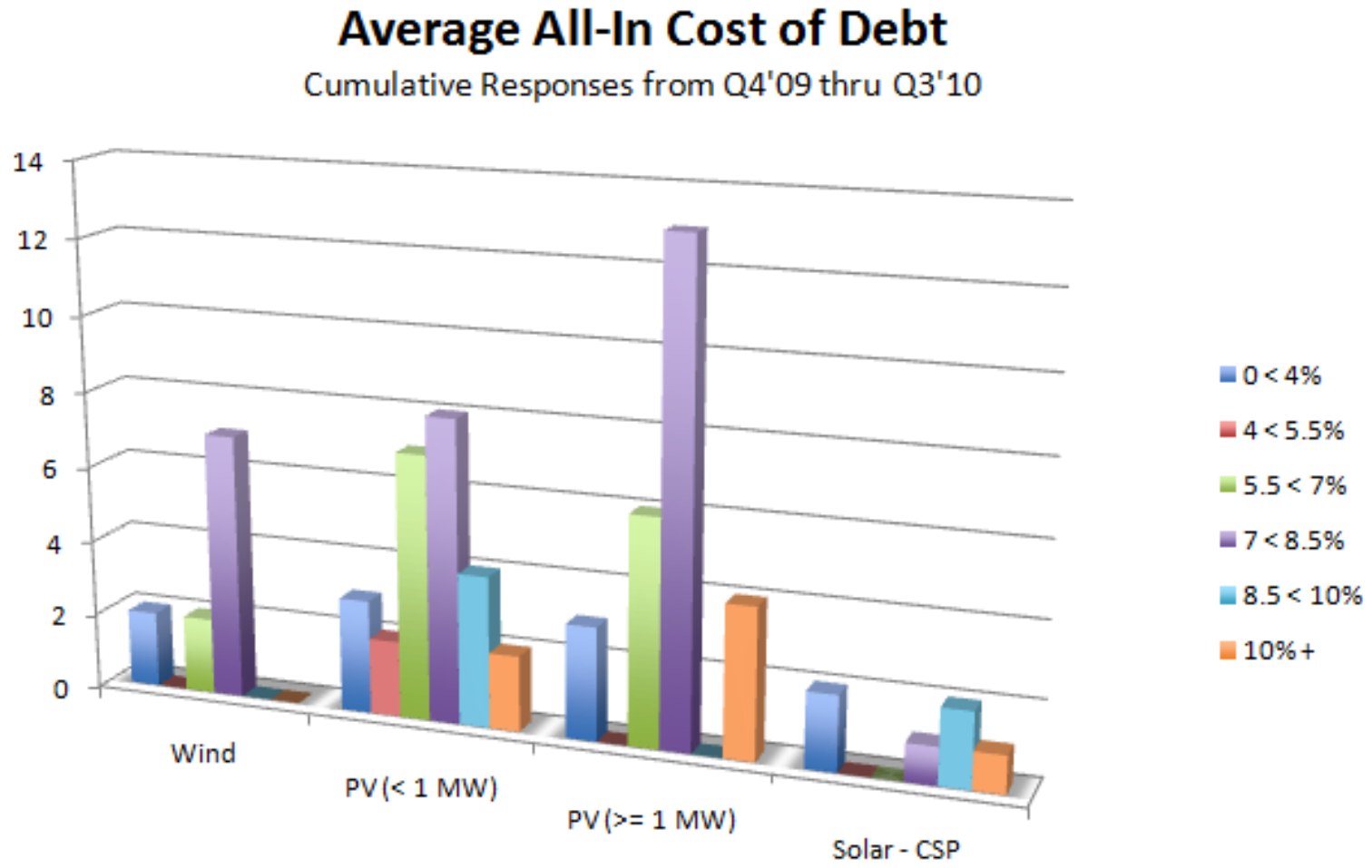
Cost of Term Debt (all-in) - Aggregate



Cost of debt most commonly reported in the 7 – 8.5% range. Some very low cost of debt reported

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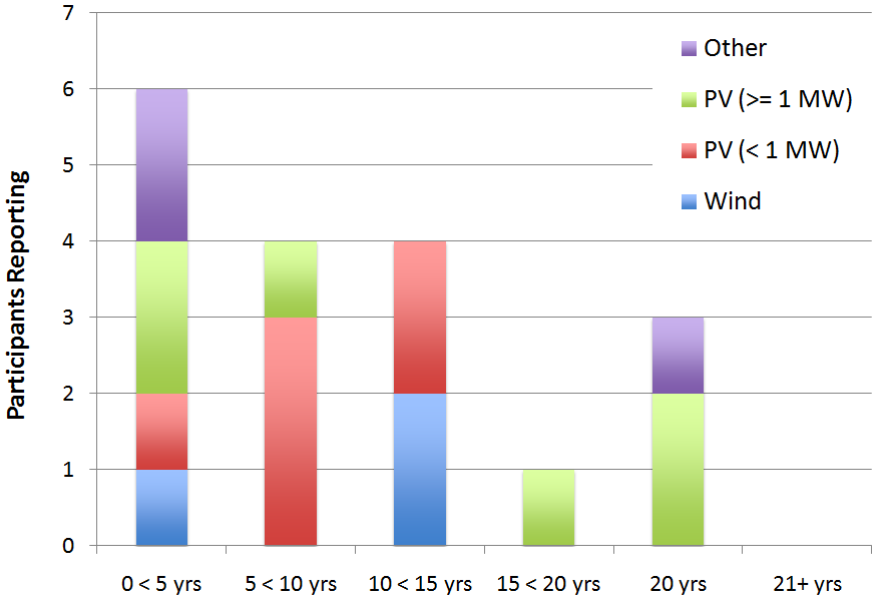
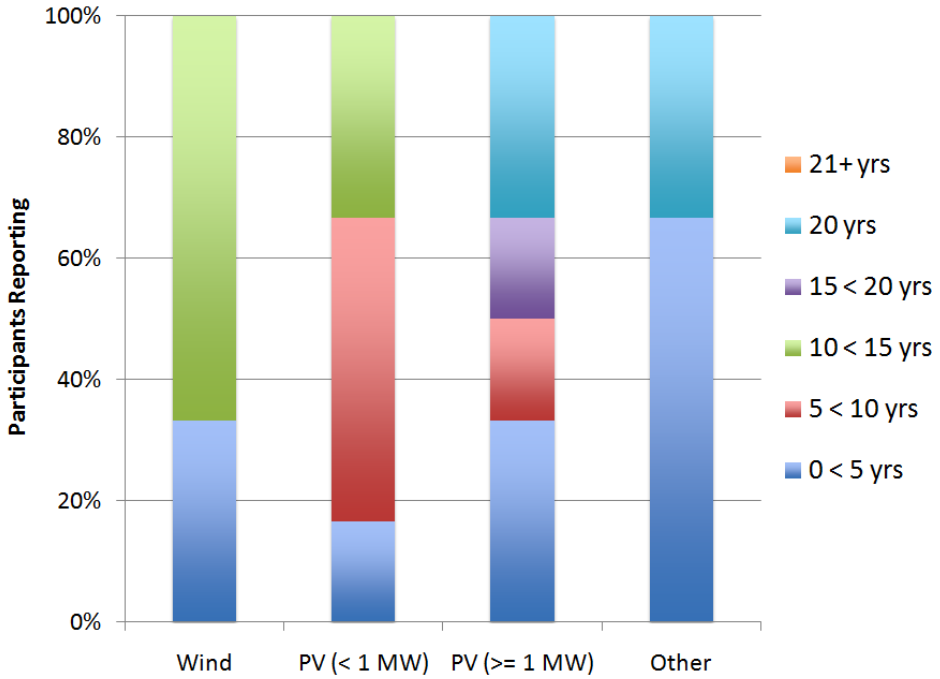
Term Debt Duration

by bin range



by technology, scaled to 100%



Small PV debt out to 20 years, larger PV and wind projects had debt held to < 15 years

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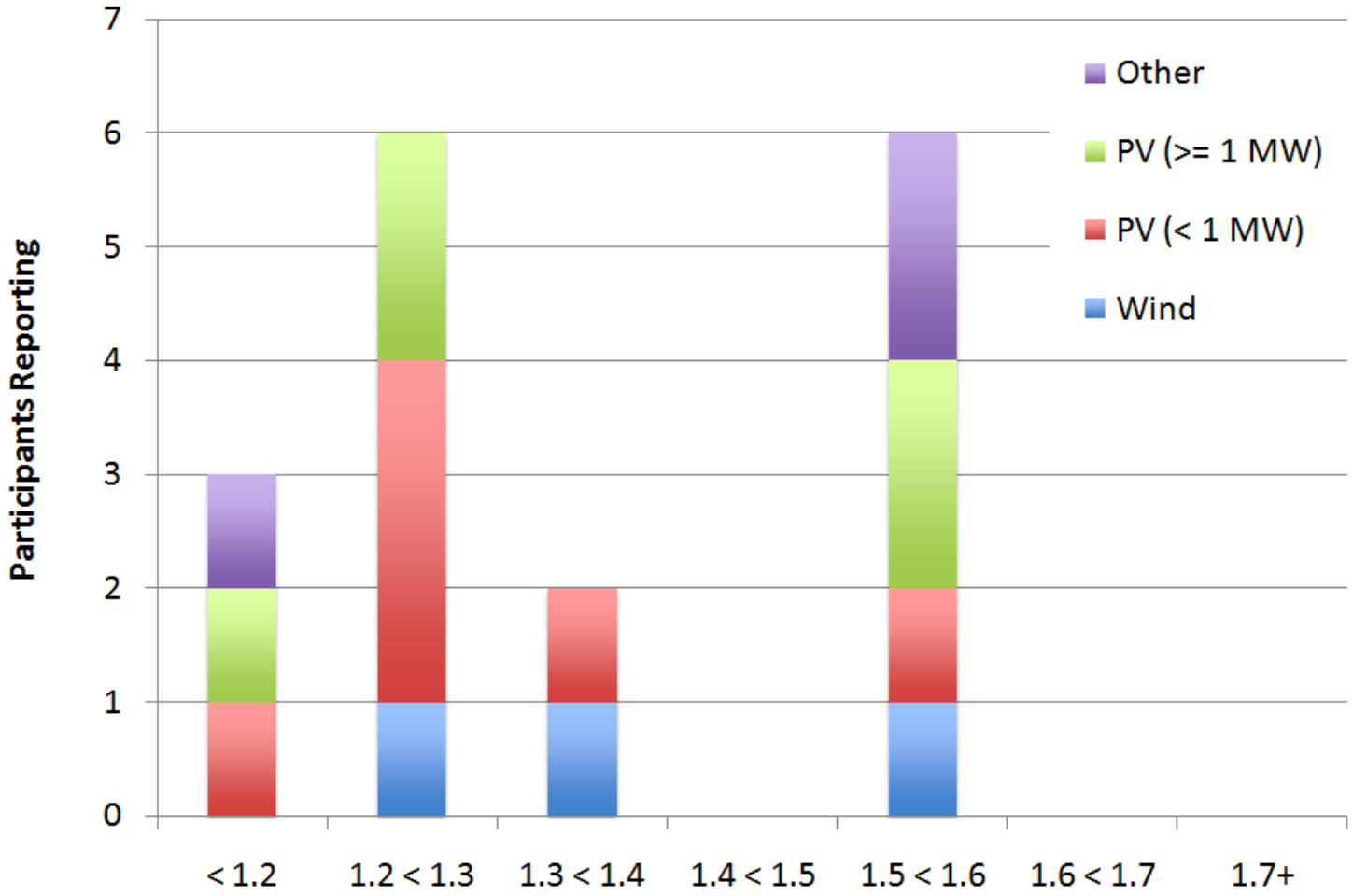
Debt Service Coverage Ratios Required



Min debt coverage ratios most commonly in the 1.2 – 1.3x range or the 1.5 – 1.6x range

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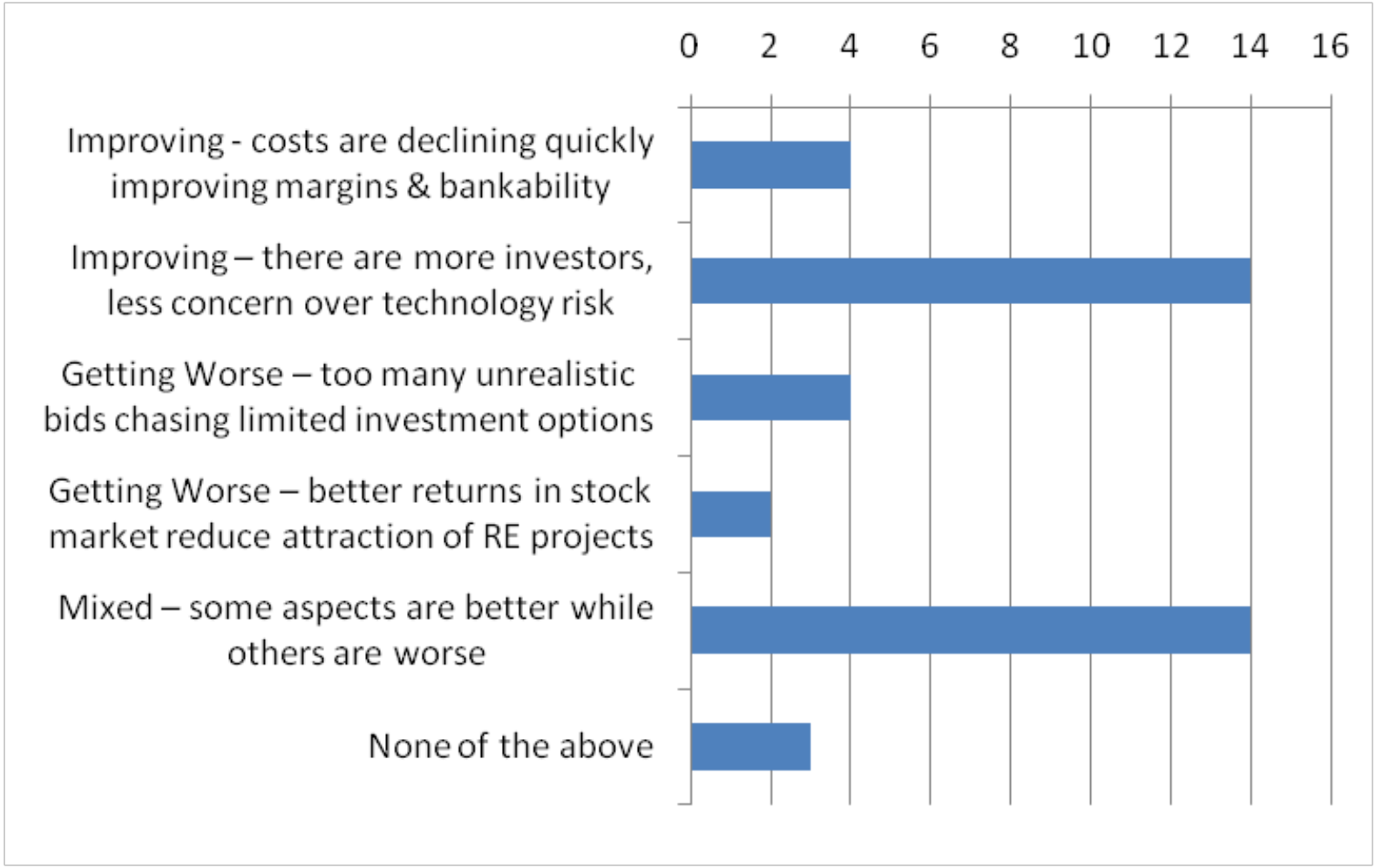
Bonus Question #2

In general, the availability of financing for RE systems is:



REFTI Questionnaire: Q14

14. Provide the average INSTALLED COSTS (before incentives) and LEVELIZED COST OF ENERGY (LCOE) (after incentives) from your projects

(LCOE is generally the present value of costs divided by the present value of energy delivered)

	Installed Costs ($ / Watt - net output)	LCOE (¢/kWh)
Wind		
Solar - PV (< 1 MW)		
Solar - PV (>= 1 MW)		
Solar - CSP		
Solar Thermal (non-elec)		
Geothermal		
Biomass - Elec		
Biomass - Non-elec		
Hydro		
Other Technologies		

Comments

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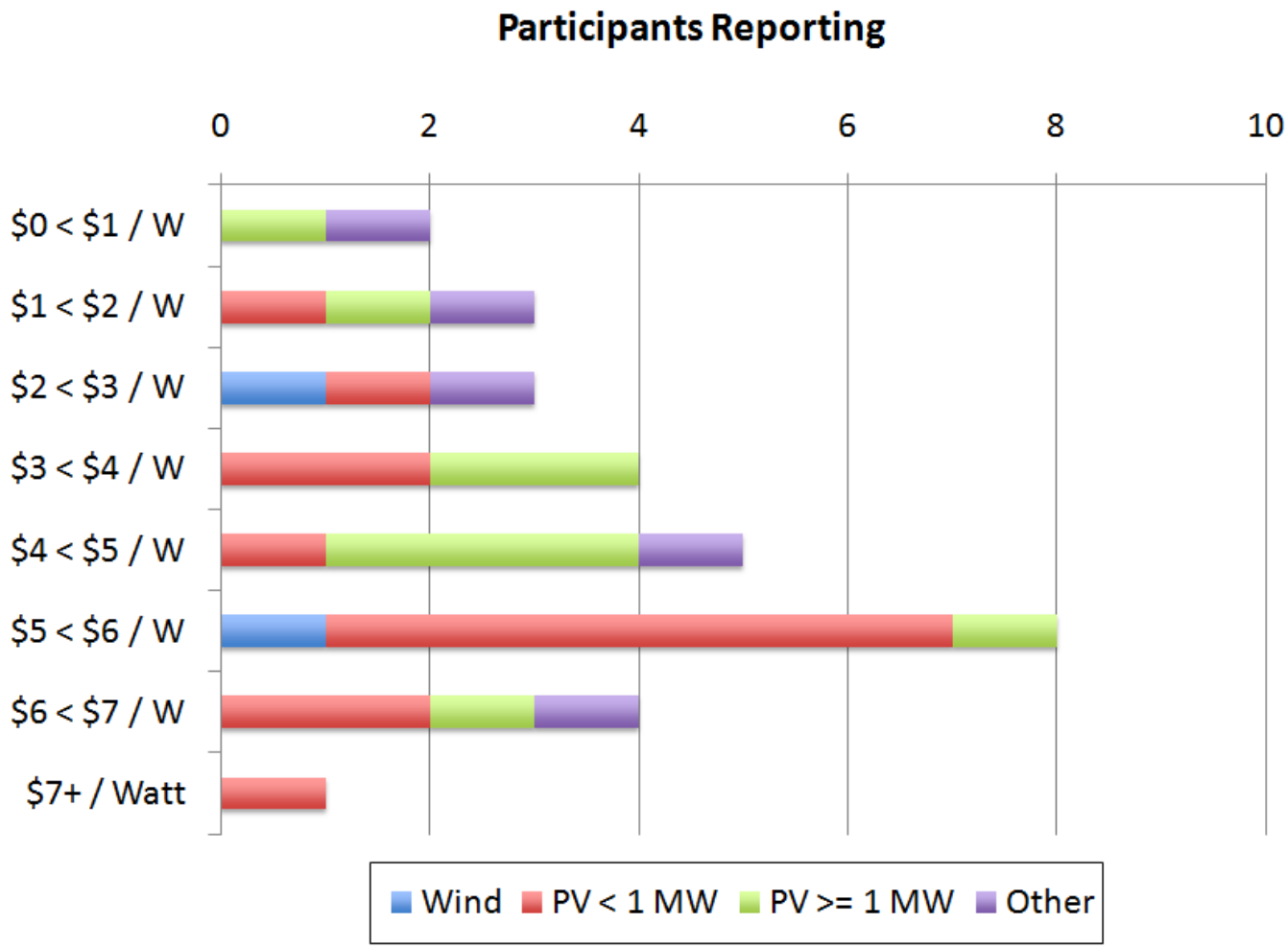
Installed Costs (before incentives)



Very wide range for small PV reported, most commonly in the $5-6/W range. Less than $1 /W installed?

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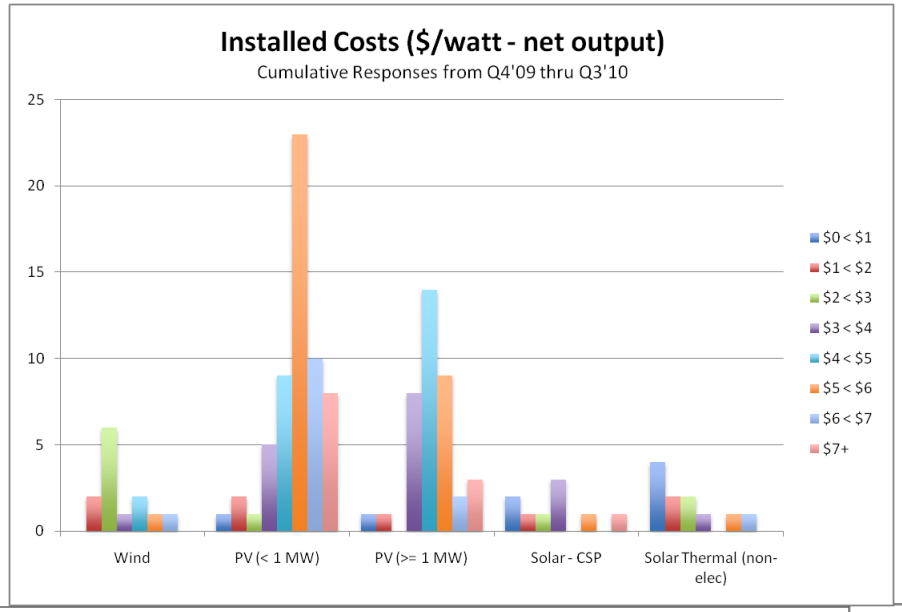
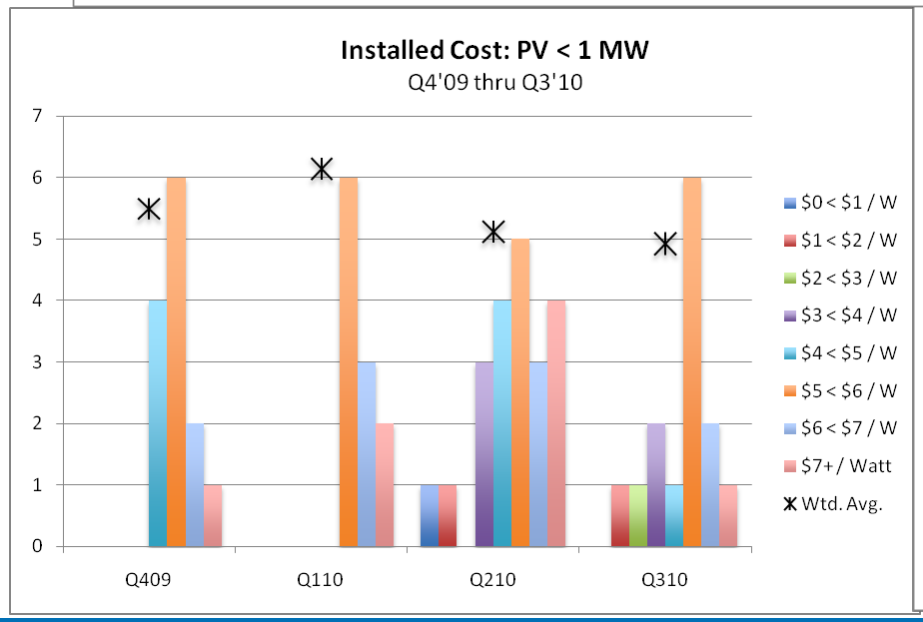
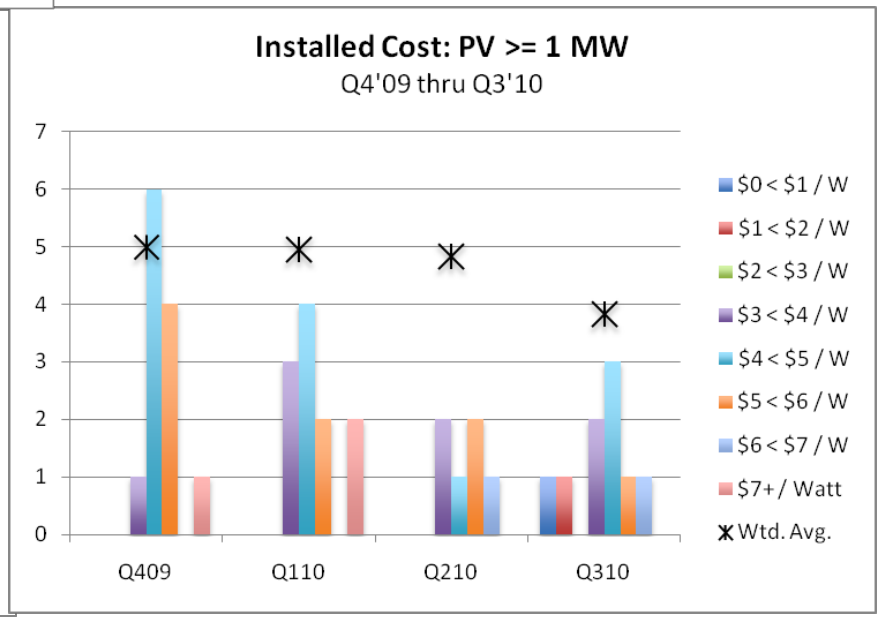
Installed Costs (before incentives) - Aggregate

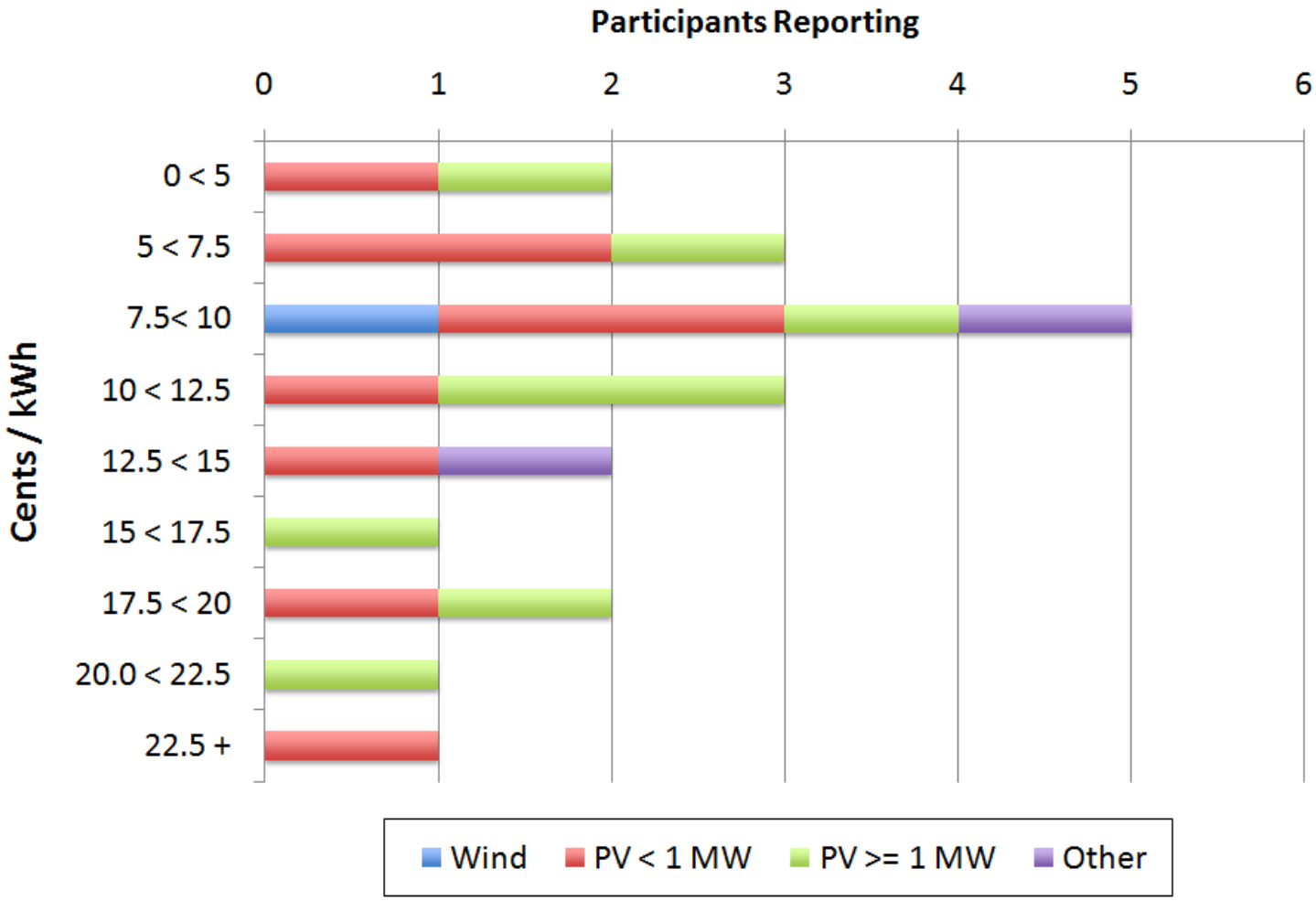


Top figure – aggregate for all incentives; bottom figures – trend for small PV and large PV over last 4 quarters. Small PV declines modestly; large PV declined significantly





Levelized Cost of Energy (cents/kWh)



RE projects most commonly reporting LCOE's in the 7.5 – 10.0 cents/kWh range (after incentives).

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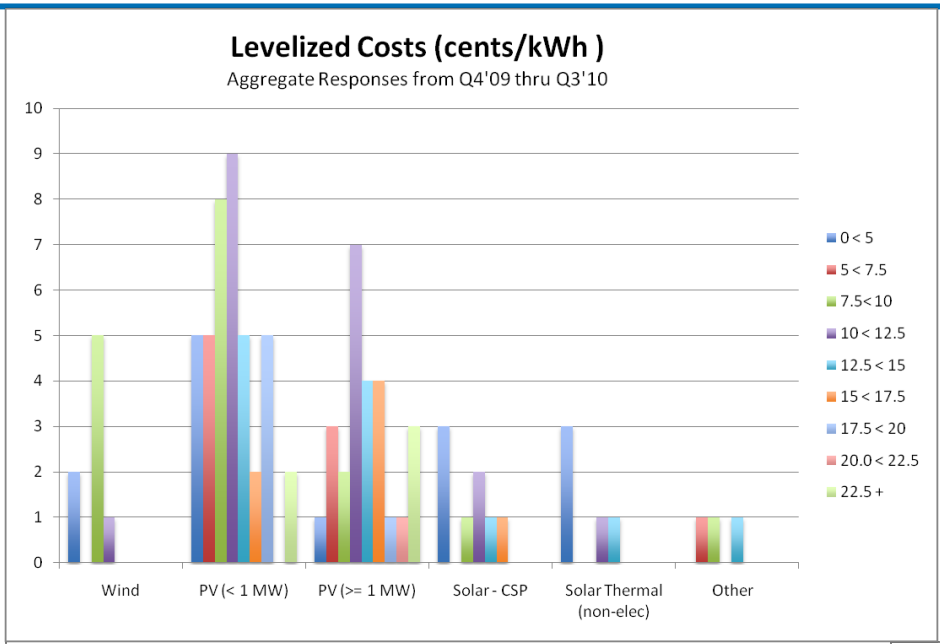
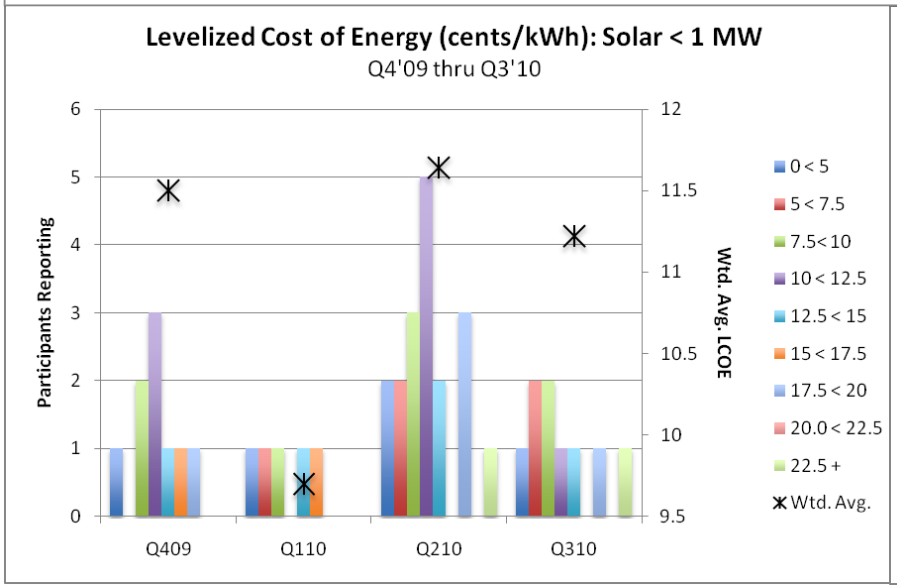
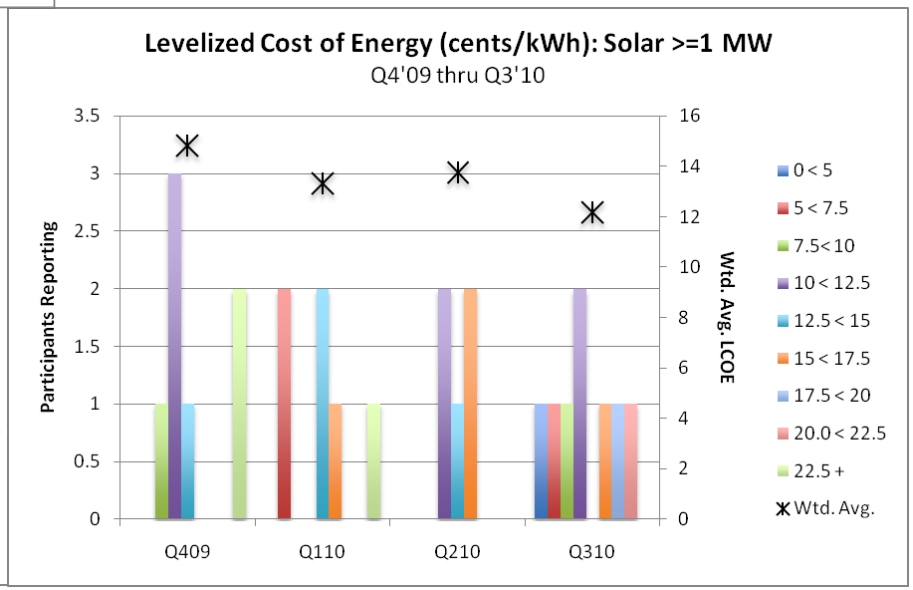
LCOE – Aggregate & Trend Results

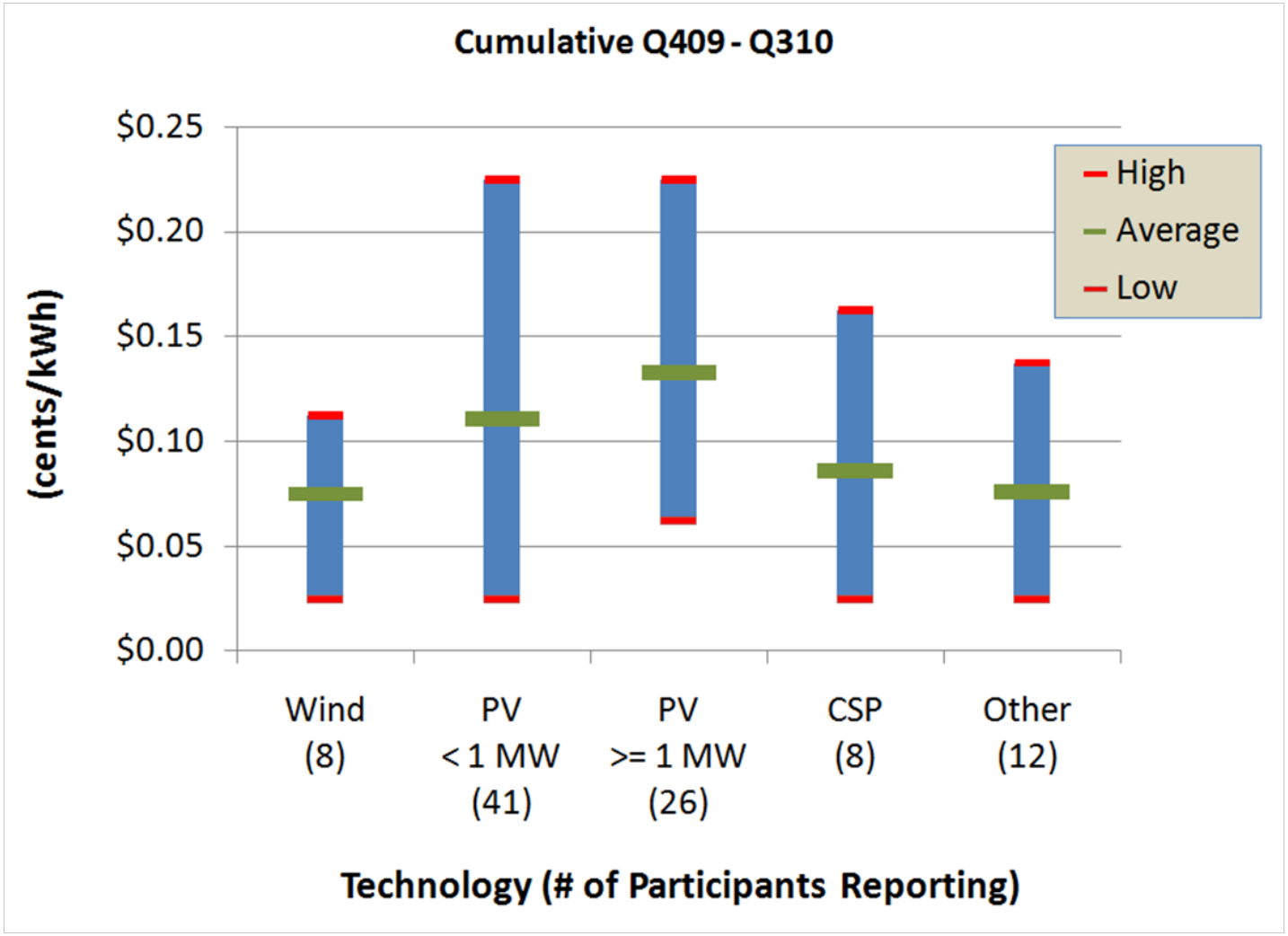


Top figure – aggregate LCOE. Bottom figures – trend for small and large PV with weighted averages. LCOEs for large PV appear to be declining; small PV trend is less clear





LCOE – Aggregate Range and Avg. (cents/kWh)



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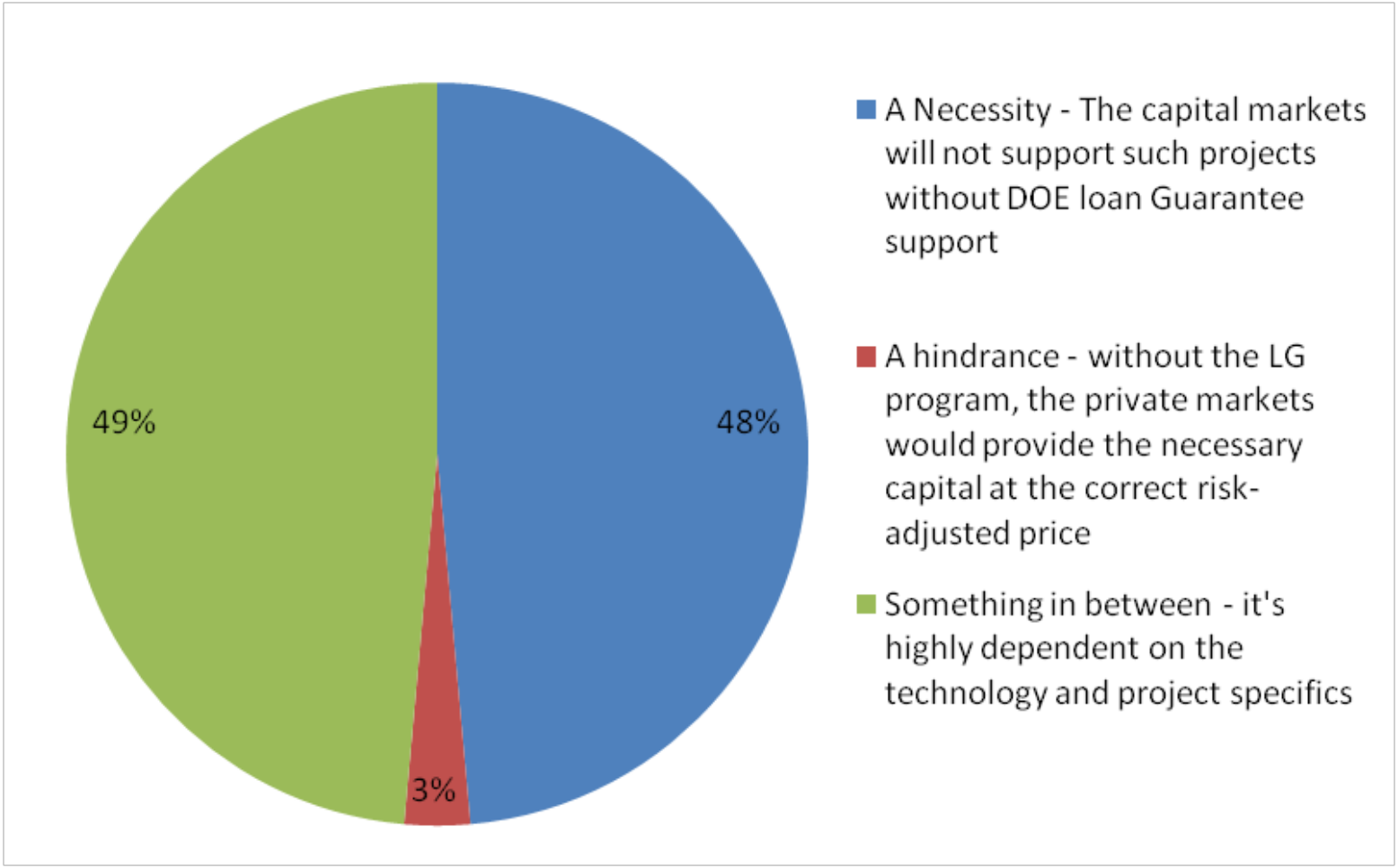
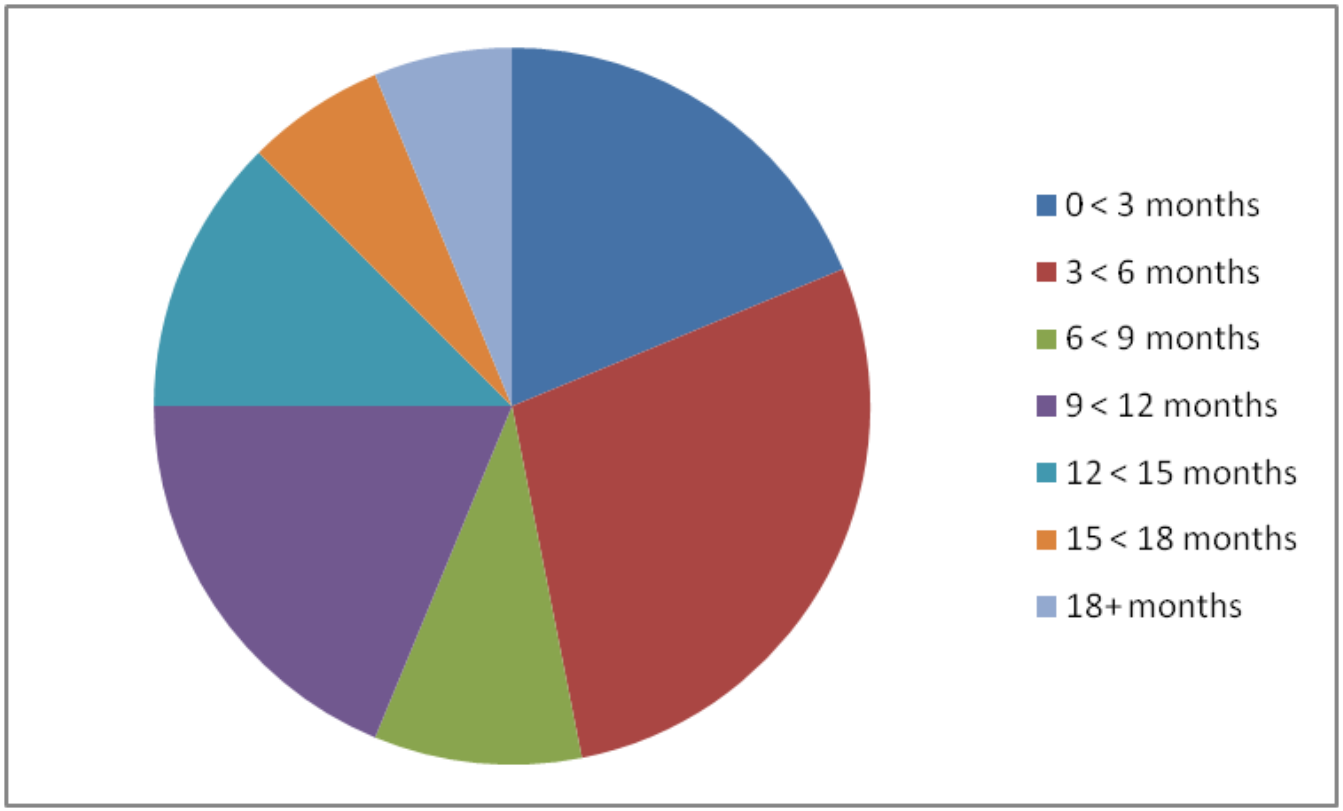
REFTI Questionnaire: Bonus Q1 (Q15)

Is the LOAN GUARANTEE program a necessity, a hindrance, or something in between?



REFTI Questionnaire: Bonus Q2 (Q16)

How long would it take the private markets to conduct due diligence on large scale, "innovative" technology projects?



75% said less than one year; almost 50% said less than 6 months

Thank you!

We appreciate your participation!

REFTI results and presentations available at:

http://financere.nrel.gov/finance/REFTI

REFTI Q4 coming out soon

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